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Information is our business.

# The NTIS Database Search Guide

DEPARTMENT OF COMMERCE
UNITED STATES OF AMERICA

**Also Includes:**

- **Vendor-Specific Search Tips**
- **How To Search FedWorld®**
- **NTIS Subject Category Codes with Scope Notes**

# SEARCH GUIDE FOR THE NTIS BIBLIOGRAPHIC DATABASE

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# SEARCH GUIDE FOR THE NTIS BIBLIOGRAPHIC DATABASE

## INTRODUCTION

## Organization of the Search Guide

**Section I - Introduction:** Provides a basic introduction to the features of the NTIS Bibliographic Database, how it differs from other government and / or scientific and technical databases and how it supplements other government databases. Descriptions of CD-ROM versions of the Bibliographic Database are also included.

**Section II - NTIS Database Elements:** Each component field of the bibliographic record is defined with examples. Presents the record structure and composition of the NTIS Bibliographic Database. Changes in the use of a field are discussed. NTIS' names and labels for the fields in the bibliographic citation are identified.

**Section III – Online Searching Hints:** Includes online searching hints arranged alphabetically by topic and field. Points covered are: searching accession numbers and specially assigned information product type numbers; abbreviations, acronyms; biological species; chemical studies; and verbalization of scientific and mathematical symbols. Distinctions between sponsoring agencies and performing agencies in the corporate author field are shown.

The NTIS subject category codes are interpreted with emphasis on health care and medicine, environment, and business-related information. Geographic features and locations are demonstrated as well as discussions of developing country, foreign language documents and translations. Searching for reprints, maps, patents, and environmental impact statements are also covered. The placement and meaning of sponsoring agency acronym codes are also noted.

**Section V – Online Access:** Presents contact information for the online vendors that provide access to the database, including the company name, address, telephone number and facsimile number. Each online service's search and display commands are presented. An NTIS bibliographic record is furnished in each vendor's format showing the vendor field names and labels for the NTIS Database. Vendor system features are listed. For additional examples of the search process, request individual documentation from each online vendor.

**Appendix A** – Contains a list of references to the authority files used by NTIS and its cooperating agencies at the Department of Energy, NASA and the Defense Technical Information Center.

**Appendix B** – NTIS Subject Category Codes, a listing of the 39 primary subject areas in which the NTIS Database is divided and their subcategories with scope descriptions.

## Purpose of the Search Guide

This guide provides the information necessary for productive and cost-effective search and retrieval. Use this manual to:

- Minimize "false hits," which are common to such large and varied databases;
- Clarify the NTIS database information derived from multiple government sources;
- Gain an in-depth understanding of the database structure;
- Provide background references and historical perspective; and
- Serve as a reference manual for users, or a teaching tool at training seminars.

## Audience

This publication targets:

- New online searchers;
- Users who are familiar with online search techniques but not familiar with the NTIS Database;
- Librarians or instructors who train users of library services; and
- Researchers using online systems.

# THE NTIS BIBLIOGRAPHIC DATABASE AND RELATED PRODUCTS

## SECTION I

## Introduction

The NTIS Bibliographic Database contains summaries of scientific, technical, engineering, and business information products acquired by NTIS from 1964 to the present. Printed or microform indexes provide access to the titles that predate the online database. The NTIS Bibliographic Database tapes are issued bimonthly. The database is available to the public through a number of commercial vendors, that are listed in Section V.

The NTIS Database combines unclassified input from the Department of Defense, Department of Energy, and NASA, with that of numerous other government agencies, among which are the Environmental Protection Agency, National Institute of Standards and Technology, and Department of Interior, to offer users a wide range of information resources. The full reports are available from NTIS for almost 90 percent of the titles announced on the database. Delivery service and ordering options are described at the end of this Search Guide.

## Leasing the NTIS Bibliographic Database

Organizations that need to search the NTIS Database frequently may wish to consider leasing the Bibliographic Database from NTIS. Requirements and pricing information may be obtained by contacting the Office of Product Management (703) 487-4929.

## CD-ROM Versions of the NTIS Bibliographic Database

Knight-Ridder Information, Inc. (formerly Dialog Information Services) distributes two CD-ROM versions of the NTIS Bibliographic Database; a two disc set that covers 1985-1994 and a three disc set that covers 1980-1994. The CD-ROMs are updated quarterly.

SilverPlatter Information offers a three disc set; 1983 through 1985 (issues 1-13); 1985 (issues 14-26) through 1990 (issues 1-21); and 1990 (issues 22-24) through 1994.

***Note:*** *The CD-ROM versions of the NTIS Bibliographic Database have different search and display options than the online database for some fields.*

## Document Delivery via NTIS

In order to satisfy NTIS Database document requests by customers, NTIS offers a competitively priced ordering service. Delivery is available for almost 90 percent of the reports found in the NTIS Database. After searching and identifying documents from the Database, customers can contact NTIS to order the corresponding full-text reports. Take advantage of this valuable service by calling 1-800-553-NTIS (6847) or to fax (703) 605-6900. Customers can email their document requests to: order@ntis.fedworld.gov, or access the NTIS World Wide Web site at http://www.ntis.gov for product ordering instructions.

## NTIS Online Searching Help Desk

The Help Desk will answer your questions on searching the database and its subject content from 8:30 a.m. to 5 p.m., Eastern time. Call (703) 605-6585.

# Scope of the Collection

Viewed by any measure, the NTIS information collection is extremely varied in its makeup. The NTIS Bibliographic Database contains information about environmental sciences, computer sciences, telecommunications, health care, physical sciences, international trade, energy, transportation, regulations, research administration, business, and education. Each year 75,000 - 80,000 titles are added to the database. These reports become a permanent part of the NTIS collection. As the U.S. Government's central technical and scientific information service, NTIS announces summaries of the research and studies sponsored by more than 600 Federal agencies as well as from state and local governments. A summary is shown in the following tables.

**Table 1**

## Titles in the NTIS Collection

| *Fiscal Years* | *Items in Collection* | *Items in Database* |
|---|---|---|
| Cumulative FY 1964 -FY 1974 | 834,111 | 388,263* |
| FY 1975 | 63,670 | 63,670 |
| FY 1976* | 73,628 | 73,628 |
| FY 1977 | 80,993 | 80,993 |
| FY 1978 | 74,927 | 74,927 |
| FY 1979 | 67,692 | 67,692 |
| FY 1980 | 77,335 | 77,335 |
| FY 1981 | 78,223 | 78,223 |
| FY 1982 | 82,863 | 82,863 |
| FY 1983 | 79,471 | 79,471 |
| FY 1984 | 71,587 | 71,587 |
| FY 1985 | 70,211 | 70,211 |
| FY 1986 | 69,760 | 69,760 |
| FY 1987 | 62,879** | 58,889 |
| FY 1988 | 68,121 | 64,539 |
| FY 1989 | 61,307 | 58,342 |
| FY 1990 | 60,376 | 57,238 |
| FY 1991 | 79,234 | 75,832 |
| FY 1992 | 75,611 | 72,635 |
| FY 1993 | 86,883 | 80,782 |
| FY 1994 | 85,763 | 74,970 |
| FY 1995 | 104,112 | 70,177 |
| **TOTAL** | **2,364,848** | **1,892,027** |

** includes items from the transition quarter when the U.S. fiscal year changed from July 1-June 30 to October 1-September 30.*

*** Beginning in 1987, certain older documents, special collections, and issues of subscription publications other than the first issue each year were entered into the NTIS collection, but not announced in the database.*

# Subject Coverage

Because the U.S. Government funds more than half of the research and engineering activities in the United States, the NTIS Database contains information on most scientific and technical subjects. The next chart shows this coverage since 1990. The subject categories, which NTIS uses in coding its database entries, are explained in detail in the appendices.

**Table 2**

## NTIS Database Subject Coverage

| *Subject category* | *1990-95 Coverage* | *Percent of Total* |
|---|---|---|
| Administration & Management | 16,563 | 2.2 |
| Aeronautics & Aerodynamics | 14,656 | 1.9 |
| Agriculture & Food | 13,787 | 1.8 |
| Astronomy & Astrophysics | 9,621 | 1.3 |
| Atmospheric Sciences | 12,586 | 1.6 |
| Behavior & Society | 21,686 | 2.8 |
| Biomedical Technology & Human Factors Engineering | 6,078 | 0.8 |
| Building Industry Technology | 9,071 | 1.2 |
| Business & Economics | 15,143 | 1.9 |
| Chemistry | 40,032 | 5.2 |
| Civil Engineering | 9,485 | 1.2 |
| Combustion Engines & Propellants | 11,475 | 1.5 |
| Communication | 10,038 | 1.3 |
| Computers, Control & Information Theory | 24,659 | 3.2 |
| Detection & Countermeasures | 5,585 | 0.7 |
| Electrotechnology | 18,807 | 2.4 |
| Energy | 41,359 | 5.4 |
| Environmental Pollution & Control | 61,970 | 8.0 |
| Government Inventions for Licensing | 6,279 | 0.8 |
| Health Care | 6,787 | 0.9 |
| Industrial and Mechanical Engineering | 21,633 | 2.8 |
| Library & Information Sciences | 25,039 | 3.2 |
| Manufacturing Technology | 20,022 | 2.6 |
| Materials Sciences | 33,676 | 4.4 |
| Mathematical Sciences | 9,079 | 1.2 |
| Medicine & Biology | 46,211 | 6.0 |
| Military Sciences | 23,899 | 3.1 |
| Missile Technology | 979 | 0.1 |
| Natural Resources & Earth Sciences | 35,053 | 4.5 |
| Navigation, Guidance & Control | 1,461 | 0.2 |
| Nuclear Science & Technology | 48,355 | 6.3 |
| Ocean Sciences & Technology | 12,306 | 1.6 |
| Ordnance | 4,894 | 0.6 |
| Physics | 71,464 | 9.2 |
| Photography and Recording Devices | 1,485 | 0.2 |
| Problem Solving Information for State and Local Governments | 14,702 | 1.9 |
| Space Technology | 19,078 | 2.5 |
| Transportation | 13,412 | 1.7 |
| Urban & Regional Technology & Development | 14,687 | 1.9 |

*Note: The percentages total to more than 100 because citations may be assigned multiple categories.*

# Information Sources

The titles in the NTIS collection are submitted by hundreds of government agencies, numerous state and local governments, federal contractors, academic institutions, foreign governments, international organizations and private sector organizations. Twenty percent of all new titles are obtained from foreign sources through various international exchange agreements.

Since the American Technology Preeminence Act (Public Law 102-245) passed in 1991, NTIS' wealth of information has increased dramatically. The ATPA requires all federal agencies to submit their federally-funded scientific, technical and engineering information to NTIS within 15 days of the date the product is made publicly available. Consequently, NTIS can provide its customers with timely access to a more diverse and comprehensive range of information.

## Representative Input of Federal Agencies 1995 Fiscal Year

| *Input* | *Organization* |
|---|---|
| **604** | Department of Agriculture |
| **2,678** | Department of Commerce |
| **11,232** | Department of Defense |
| **22,755** | Department of Energy |
| **1,805** | Department of Health & Human Services |
| **989** | Department of the Interior |
| **1,233** | Department of Transportation |
| **3,066** | Environmental Protection Agency |
| **6,243** | NASA |
| **238** | National Science Foundation |
| **372** | Nuclear Regulatory Commission |
| **219** | U. S. Trade and Development Program |
| **524** | Legislative Branch Agencies |

# International Sources

NTIS is the lead U.S. Government agency for cooperation in international technical information exchange. Twenty percent of all new titles come from foreign sources through various international exchange agreements. Overseas organizations that currently contribute to the NTIS collection include the Japan Ministry of International Trade and Industry (MITI), organizations of the Japan Science and Technology Agency, laboratories administered by the United Kingdom Department of Industry, the West German Federal Ministry of Research and Technology (BMFT), the French National Center for Scientific Research (CNRS), and many more.

## Top Ten Non-U.S. Contributors - 1995

| *Country* | *Number of Citations* |
|---|---|
| Germany | 8,489 |
| Canada | 2,974 |
| Netherlands | 1,202 |
| Japan | 1,091 |
| International Agencies | 996 |
| Sweden | 887 |
| France | 841 |
| *U.S.S.R. | 675 |
| United Kingdom | 631 |
| Finland | 424 |

**These documents from the former Soviet Union were published prior to the breakup into the Commonwealth of Independent States.*

# Information Product Types

The NTIS information collection contains a wide variety of types of publications, as well as other media for distributing information. The following table summarizes the types of information products received by NTIS in 1995.

## Types of Information Products

| *U.S. Government Produced* | *Number* |
|---|---|
| TOTAL | 49,543 |
| Technical reports | 32,187 |
| Conference proceedings | 6,446 |
| Journal articles | 6,059 |
| Theses | 1,101 |
| Bibliographies | 3,317 |
| **Computer Products** | |
| Software | 63 |
| Datafiles | 424 |
| **NTIS Published Searches** | |
| Published Searches | 3,015 |
| **Selected Applied Technologies** | |
| Patents and Government inventions available for licensing | 1,007 |
| **Foreign Acquisitions** | |
| TOTAL (14,593 in English) | 20,527 |
| Technical reports | 18,062 |
| Conference proceedings | 1,348 |
| Journal articles | 272 |
| Theses | 795 |
| Bibliographies | 61 |

# DATA ELEMENTS OF THE NTIS BIBLIOGRAPHIC DATABASE

## SECTION II

In the 1960's, under the aegis of the Committee on Scientific and Technical Information (COSATI), Federal Council on Science and Technology, the managers of scientific and technical information (STI) programs in the federal government adopted standard guidelines for cataloging technical reports. Four of these agencies, NTIS, the Department of Energy's Office of Scientific and Technical Information, the National Aeronautics and Space Administration's Scientific and Technical Information Program, and the Defense Technical Information Center, exchange bibliographic tapes and cooperate on information services-related projects. These agencies, along with the Department of Health and Human Services, sponsor more than 90 percent of federally funded research and development.

The fields of the NTIS Bibliographic Database are presented below in the order that they appear on the electronic media sent to online database host system operators ("vendors") and other organizations that lease the database from NTIS for internal use. Each vendor loads the NTIS Database slightly differently and the placement of the fields may vary.

### FIELD NAME: NTIS Order No.

**Examples:**
Citations indexed and abstracted by NTIS
PB95-123456XAB

Citations provided by NASA
N94-30979/6XAB

Citations provided by the Department of Defense
AD-A259 656/7XAB, AD-D123 456XAB, AD-M

Citations provided by the Department of Energy
DE94002590XAB

Citations provided by Fach-informations-zentrum (FIZ)
TIB/A93-02952XAB

Citations provided by Micromedia Ltd. (Canada)
MIC-94-016561XAB

**Definition:** Each title has a unique NTIS order number (accession number/identification number) assigned in this field. This number should be used when ordering the title from NTIS.

All NTIS order numbers have alphabetic prefixes. Some alphabetic prefixes indicate the originating agency of the report collections, as shown in the above examples. The alphabetic prefix is followed by a five- to eight-digit number and three alphabetic characters. When searching, it is a good practice to truncate after the first six digits to find an accession number; however, when placing an order, the entire alphanumeric number order must be used.

***Note:*** *Not all of the government agencies that have individual accession number alphabetic prefixes are shown in the examples. The examples are limited to agencies with the largest volume of records in the database.*

### FIELD NAME: Subject Category Codes

**Examples:** 70A, 48D

**Definition:** NTIS and its predecessor organization have used two subject classification schemes:

1) the Committee on Scientific and Technical Information (COSATI); and

2) the NTIS Subject Category Classification.

Any one document may have up to five subject categories assigned to it. Occasionally some documents may have more than five category codes assigned to them. If a title covers three or more subcategories of a major subject category, it is assigned to the general section of the major category code. Each citation in the database contains the full number of subject category codes that reflect the subjects covered by 20 percent or more of the report.

The NTIS Subject Category Classification has been used exclusively since July 1986. A list of the subject category codes is included in this guide as Appendix B. It is used to arrange the citations into subject areas.

### FIELD NAME: NTIS Prices

***Note:*** *This field is not searchable.*

**Example:** PC A02/MF A01

**Definition:** These are alphabetic codes for each medium in which the item is delivered:

Paper Copy (PC), Microfiche (MF), CD-ROM, Audiovisual (AV), magnetic tape (mag tape), and diskette. The numeric part of the code determines the price of an individual item. The current price schedule is shown on page 84.

### FIELD NAME: Corporate Source(s)

**Example:** Army Information Systems Command, Chambersburg, Penn.

**Definition:** This is the name of the organization(s) and / or author affiliation(s) that performed the research and prepared the report(s). The corporate source is also known as the corporate author and performing organization.

Since 1980, NTIS has maintained an up-to-date machine-readable corporate source authority list with standardized names and a nine digit organization code number. The nine digit code appears in the database and is searchable.

Some online services asterisk the performing organization names to distinguish them from the sponsoring organization(s). The names of organizations have been entered in full and in abbreviated forms.

**Examples:** Massachusetts Inst. of Tech
Mass Inst. of Tech
Massachusetts Inst. of Technology

### FIELD NAME: Title

**Example:** Guide to Evaluating Thermal Effects in Concrete Pavements

**Definition:** The name of the document which appears on the title page or document cover. A colon is used when separating a subtitle from the main title.

Foreign language reports present the foreign language title first, followed by the English translated title in parenthesis. When English translations are made of foreign language documents, the English title is presented prior to the foreign language title.

### FIELD NAME: Journal and Database Issue

This field contains a title's original announcement journal volume and issue in the format "JVVII":

where J = a letter designating the journal
where VV = a two-digit volume number; and
where II = a two-digit issue number.

Example: u9412, GRAI9412, GRA&I9412.

This corresponds to reports that were announced in GRA&I Issue 9412. Following the GRA&I issue number are letter codes that designate other agencies' announcement journals. Some online vendors list the example shown and some translated the "u" into GRAI or GRA&I with the volume and issue. "n" was the designated prefix code for documents which were announced in the *Department of Energy Announcement Journals Nuclear Science Abstracts* from 1964–1976 and *Energy Research Abstracts* from January 1976–August 1976. After August 1976, the "n" code in this field was discontinued. "s" is used in this field to identify NASA documents announced in the journal, Scientific and Technical Aerospace Reports (STAR). Some vendors use the "s" and some present the name of the STAR journal in this field.

**Definition:** This field is used to identify the NTIS Announcement Journal volume and issue in GRA&I, and any source agency announcement journal volume and issue in which the citation first appeared.

### FIELD NAME: Title Note

**Example:** Datafile, Audiovisual, Thesis, Software, Final Report, Master's Thesis, Patent, Patent Application, Models-simulation, VHS video, CD-ROM.

**Definition:** Additional title information that clarifies the document or report type. The field sometimes contains a subtitle.

### FIELD NAME: Personal Author(s)

**Example**: Hyder, M. L., Smith, J. C.

***Format:*** *Full last name comma [space] first initial period [space] middle initial [period].*

**Definition:** This field lists the personal author(s) name(s).

Format: Names are recorded in the same order and as they appear in the document, with first and middle initials. All titles, degrees, Jr., Sr., II, III and IV are omitted. Prior to 1984, some names appear with the last name followed by the first name and middle name or middle initial.

***Note:*** *There is no authority list for personal author names. Searchers will need to develop search strategies to provide for variations, using truncation, adjacent, etc., to obtain all the reports by one author. Truncation in online searching means to cut a word short at any point in its order, for example, to retrieve all terms with a common root or both singular and plural forms.*

### FIELD NAME: Report Date

**Example:** August 1993
2 Oct 1994
c19 Mar 94

**Definition:** This field contains the date the document was completed. However, on translations and journal articles this date may correspond to some other time, such as the date of the translation, the date of the journal issue, the date of a filing for a patent, or the date of publication in some other journal.

***Note:*** *Beginning in mid-1978, a lower case "c" appears for the citations of copyrighted material, as seen in the third example.*

### FIELD NAME: Pagination or Number of Items

**Example**: 103 p*
1 mag tape
2 diskettes

**Definition:** This field contains the number of paper or microfiche pages in a document. Blank pages are not counted. The field also notes the number of magnetic tapes, diskettes, VHS tapes, cassettes, etc.

***Note:*** *An asterisk appearing after the page count indicates that the report generated a great deal of interest when it was announced. This is not a searchable field.*

### FIELD NAME: Country of Publication

**Example:** France

**Definition**: The country in which the document originated or was published.

***Note:*** *Each online vendor provides either the full country name or code in its specific search process. International agencies may supply the country in which they are located. In some cases, this field may be blank because the source agency did not provide the information.*

### FIELD NAME: Language of Document

**Example:** English, French

**Definition**: The language in which the full document was written.

***Note:*** *If the abstract is in English, but the document is written in another language, then only the language of the full document is identified, and not the language of the abstract.*

### FIELD NAME: Report Number

**Example:** Department of Transportation
TR-93-03-T

Environmental Protection Agency (EPA)
EPA / 600 / J-94 / 280

**Definition:** The number the sponsoring agency assigns to the title. Most report numbers have alpha prefixes followed by numerics. This field may be blank or may contain one or two report numbers assigned by the performing organization(s).

***Note:*** *When the performing and sponsoring organization are the same, the sponsoring organization's report number will appear in this field, but not in the monitor number field. If the document doesn't have an agency report number, this field is blank.*

### FIELD NAME: Contract or Grant Number(s)

**Example**: USDA-88-COOP-2-3482
NSF-BBS-8820984
DI-14-35-001-30501

**Definition:** This field contains the contract or grant number assigned by a federal agency to the research project which resulted in the cited document.

### FIELD NAME: Project and Task Numbers

***Note:*** *these have not been used since 1984.*

**Example:** UCAl-WRC-W-428 ARGUS Calibration

### FIELD NAME: Monitoring Agency Number

**Example:** AFGL-TR-85-0194
EPA / 560 / 7-85 / 000-1

**Definition:** This field provides the report number(s) assigned by the sponsoring organization(s) unless the latter is also the performing organization(s). When the sponsoring and performing organization are the same, the monitoring agency numbers are placed in the report number field.

### FIELD NAME: Supplementary Notes

**Example**: See also...
Supersedes...
Other related reports
Pub. in Proceedings of the American Control Conference...
Sponsored by Department of Energy, Washington, D.C.
Sponsored in cooperation with...
Any additional information about the document

**Definition:** This field presents: the source of a translation; language of a report, if other than English; source of a periodical citation; supplemental performing or sponsoring organizations; additional contracts or grants; and conferences, etc.

### FIELD NAME: Availability Statement

**Example**: Also available as PB-1234
Also available from Supt. of Docs. as...
Available through FedWorld® by download only
Also available as a set of reports

**Definition:** A statement of availability that appears when there are special ordering instructions, especially when a report is not available from NTIS or when the report is available from NTIS *and* another organization. Magnetic tapes and diskette products always carry a special descriptive statement in this field concerning their format.

### FIELD NAME: Descriptors

**Example**: Air pollution control
Mechanical properties
*Corrosion prevention

**Definition:** Descriptors are single or multiword subject terms assigned by NTIS or other contributing agencies. These descriptors use the controlled vocabulary thesauri or word lists which appear in the reference list Appendix A.

Descriptors preceded by an asterisk are those terms determined to be of greatest importance in describing the subject content of a report. Use these asterisked terms to limit an online search. Reports indexed by NTIS are assigned descriptors for the most specific concepts covered in the documents and for applications of the research.

Reports announced by NTIS but indexed by another agency contain that agency's descriptors from its own thesauri. The three major agencies currently providing their own descriptors are: the Department of Defense Technical Information Center (DTIC); Department of Energy (DOE); and the National Aeronautics and Space Administration (NASA).

### FIELD NAME: Identifier

**Example**: Fugitive dust
AIDS (Acquired Immune Deficiency Syndrome)
Automobile exhaust emissions

**Definition:** Identifiers are single or multiword subject terms used to express concepts for which there are currently no adequate descriptors. As new concepts and technologies arise, new subject terms not found in existing thesauri are placed in the Identifier field.

Identifiers preceded by an asterisk have the same significance as Descriptors preceded by an asterisk. Identifiers include names of chemical compounds, cities, biological species, computer programs, research projects and scientific instruments.

### FIELD NAME: Abstract

**Example**: Electron spectroscopy has become one of our most important tools for the study of electronic structure of solids and surfaces. Under this contract, we studied the passivation and inhibition of corrosion, utilizing the spectroscopic techniques of x-ray photoelectron absorption fine structure (NEXAFS).

**Definition:** Abstracts in the NTIS Database may be either indicative or informative, based on the type of document. Informative abstracts identify the methods, results, applications, and conclusions. Indicative abstracts describe content or scope, i.e., a handbook of chemical formulas, chapter titles, or table of contents of a textbook.

Abstracts are usually limited to 200 words. The NTIS database contains a mixture of author and NTIS-written abstracts. Many of the author abstracts are modified by NTIS. Since 1980, no modifications have been made to abstracts prepared by the Department of Defense, Department of Energy or the National Aeronautics and Space Administration.

### FIELD NAME: Title Annotation

**Example**: Reprint: Comparison of Variance Estimators of the Horvitz-Thompson Estimator for Randomized Variable Probability Systematic Sampling.

**Definition:** This field provides an additional description about the information product.

***Note:*** *This is not a searchable field. However, some online vendors place this information in the document type field. This will be defined further under Search Hints.*

# ONLINE SEARCHING HINTS

SECTION III

## Abbreviations

Abstracts and other fields often contain abbreviations. However, all subject terms are spelled out in the descriptor or identifier fields.

## Accession Numbers (also known as NTIS Order Numbers)

NTIS order numbers consist of this pattern: alpha character-2 digit year-six digits-three letter code.

**Example:** PBYR-123456XAB may be truncated as PB94-123456 truncation symbol number.

When searching, truncate the number after the sixth digit. When searching for an NTIS order number there are two options: (1) to display a list of the neighboring order numbers to select the correct number and closing 3-letter code or; (2) to truncate the order number after the sixth digit following the year number.

NTIS produces PB numbers with a first digit or first two digit number series designating a type of information product:

**Example:**

| | |
|---|---|
| Subscription products | PB94-9 |
| Published Searches | PB94-8 |
| Training Materials | PB94-7 |
| Computer Products | PB94-5 |
| Computer Product Subscriptions | PB94-59 |

(Each example should be followed by a truncation symbol, which varies by online vendor.)

Some agencies that maintain their own number series are noted in the accession number field description. The NTIS accession / order number is not always the same as the host vendor's. Searchers should review the record format and field qualifiers of the vendor(s) of their choice.

Searching for report numbers in the NTIS Database requires skill because of the punctuation used between letters and numbers. The above examples are specific to certain product types.

***Hint:*** *To limit a search to computer products, in addition to using descriptor or identifier terms such as "data file" and "software," combine the set with PBYR-5 plus truncation symbol.*

## Acronyms

NTIS spells out each acronym used in a citation if the author has supplied it, unless it is so common that it would be unnecessary to do so, e.g., DNA for Deoxyribonucleic Acid. Within the abstract, the phrase explaining the acronym is placed first, followed by the acronym in parenthesis. In the identifier field, both the complete phrase and acronym are provided for searching.

## Biological Species

Plants, animals, and microorganisms are indexed with their genus and species names and / or the family name. The common name is also indexed if the author has used it and / or if it is known. If a biological subject term is in one of the recommended thesauri, it is posted in the descriptor field.

**Examples:**

Descriptors: Liriodendron tulipifera
and also Tulip tree.
Descriptors: Mammals; Carnivora; Taxonomy
Identifiers: Hyaena; Hyaena Brisson; Striped Hyaena,
Felidae; Panthera leo persica
Descriptors: Parasitic diseases; Plasmodium knowlesi; Rhesus monkeys
Identifiers: Laboratory animals

## Subject Category Codes/ Classification

### What they are

NTIS classifies citations into 39 subject categories. Each of these subject categories is divided into subcategories. This method provides sorting categories for both hard and soft sciences.

All subject categories consist of three character codes: two numerics and one alpha character. The numeric codes represent entire categories such as chemistry, environmental pollution and control, civil engineering, et al. The alpha codes are used to designate subcategories within these broad categories. The number of NTIS subcategories posted to an information product averages from one to five.

### What they do

Although most online searching is conducted using subject index terms (keywords), subject categories are also very important. Subject categories can be combined with keywords to eliminate false retrievals ("hits").

**Example:** Combining "Lead" with the NTIS subject category 57Y (Toxicology), retrieves report citations about the toxicity of lead, rather than lead use as an additive in iron alloys.

**Example:** Citations for "Geothermal energy" reports can be retrieved by searching the NTIS category 97P because this category is specific to geothermal energy. Subject categories may be designated as Category Codes or Subject Headings, by the online vendor. Always review field designations in the vendor(s) documentation.

### NTIS Subject Categories

Listed in Appendix B are the subject categories NTIS uses to classify new documents. Each subject category is followed by a list of secondary subject categories. Searches can be conducted by using the actual text of a subject category (i.e., management information systems), or using the subject category code (i.e., 70C) that follows each subject. Because each abstract in the database is indexed on all words in the abstract, searching using the subject category code will reduce the number of stray hits and provide a list of more relevant documents.

## Category Codes with Asterisks (Highlighted Subject Category Codes)

An asterisk displayed after the subject category code indicates that the report is highlighted for being particularly significant in its content, approach or presentation. To limit a search, use an asterisk with the subject code in the search statement.

### Department of Energy (DOE) Subject Category Codes

DOE titles are assigned subject category codes in the identifier field. These codes have the format ERDA/123456 or EDB/662240. These numbers are defined in the publication *International Energy Subject Categories and Scope. Revision 2* (NTIS Order Number: DE 92018520).

## Chemical Nomenclature

NTIS uses the chemical names, trade names, CAS registry numbers, and common names included in the document as descriptors or identifiers. For a comprehensive retrieval, search all known names and classes of a compound.

Chemical compounds are listed with their common name, chemical name, and class of compounds. NTIS lists compounds hierarchically with their chemical classes posted in the descriptor field as well as the individual chemical name. If numerous chemical compounds are the subjects of the research, the classes of compounds are generally listed, but not each individual chemical compound.

Standard chemical abbreviations for the elements may be used in the abstracts, but the name of the element is always posted in its entirety in the descriptor field. Chemical elements may also be posted in their element groups, such as alkali metals, alkaline earth metals, rare earth metals, etc.

**Examples:**

Descriptors: Hydrochloric acid
Chlorine
Anilines
Amines

**Examples**:

1. Descriptors: Chlorobenzenes (general class)
   Identifiers: Trichlorobenzenes
   1,2,4-Trichlorobenzene
   1,2,3-Trichlorobenzene
2. Descriptors: Metals
   Platinum
   Precious metals (general class)
   Rhodium
3. Descriptor: Chlorobenzenes (general class)
   Identifier: Pentachlorobenzene (specific compound not found in recognized thesauri)
4. Descriptors: Chlorine organic compounds (general class)
   Chlorobenzenes
   Chloroform
   Carbon tetrachloride
5. Inorganic compounds not found in thesauri:
   Lead acetate
   Descriptor: Lead inorganic compounds
   Identifier: Lead acetate

Since 1979, the Chemical Abstract Service's (CAS) Registry Number System cites unique numbers if they are mentioned in the item being indexed. Registry numbers are recorded in two formats: the standard format *with* dashes between numbers, or the abbreviated format *without* dashes. Thus the number may appear as "CAS Registry No: 10016-20-3" or as "CAS Registry No: 10016203" in the identifier field. It may also be known as "CAS No. 10016-20-3." Each online supplier has a field qualifier for these numbers.

**Example:**
Identifier: Chloramines, CAS 7782505.
Identifier: Formaldehyde, CAS 50-00-0.

For industrial chemicals, pesticides, and pharmaceuticals, NTIS uses the Chemical Abstracts Service nomenclature and the approved common name. NTIS uses the United States Adopted Names (USAN) (Reference No.) when classifying drugs.

**Example**:
Descriptor: Metal Complexes
Identifier: FDDC
[Bis(trifluoroethyl)dithiocarbamate]

**Example**:
Descriptor: Chlorinated aromatic hydrocarbons
Identifier: PCBs(Polychlorinated biphenyls)
Polychlorinated biphenyls

# Chemical Trade Names

Trade names such as Nylon are posted in addition to the generic plastic or polymer name.

**Example:** Descriptors: Nylon, Polyamide resins.

# Computer Programs and Products

Computer products include data files and software available on magnetic tape, diskette, CD-ROM, videotapes, and optical disks.

Search for items that identify programs and products by adding the terms "software," "computer programs," "datafile," and / or "model-simulation" whenever applicable. When searching for computer programs in machine-readable form, combine the terms "software" or "computer program" and the terms "magnetic tape" or "diskette," (found in the Title Note field, see p. 11 of this manual) using the appropriate field qualifier.

# Corporate Sources

Two types of corporate sources are found in the NTIS database: performing organization(s) and sponsoring organization(s).

## Performing Organization(s)

Most reports are cataloged with the name of the organization(s) that prepared the report. When searching for corporate sources for the years prior to 1980, users must be aware of the cataloging differences caused by multiple agency rules. These differences generally occurred in abbreviations and in punctuation. In 1980, NTIS created a corporate source authority database and a nine-digit code for each corporate source, eliminating these discrepancies. The nine-digit codes appear in each citation.

## Sponsoring Organization(s)

The sponsoring organization is always a government agency. The sponsoring organization is listed if it is also the performing organization. Beginning with NTIS Bibliographic Database GRA&I issue 74-21, reports cataloged by NTIS have included the sponsoring organization as well as the performing organization. Beginning with NTIS Bibliographic Database GRA&I issue 76-21, DOE reports have been cataloged with the sponsoring organization.

Examples of performing organization(s) and sponsoring organization(s) in the same report(s):

**Example**: PB94-171444XAB
**P.O.** Emory Univ., Atlanta, Ga., Carter Center
**S.O.** Agency for International Development, Washington, D.C. Bureau for Latin America and the Caribbean

**Example**: PB94-173358XAB
**P.O.** North Carolina State Univ. at Raleigh. Sea Grant Coll. Program
**S.O.** North Carolina Dept. of Environment, Health, and Natural Resources

**Example**: DE94003817XAB
**P.O.** Westinghouse Savannah River Co., Aiken, S.C.
**S.O.** Department of Energy, Washington, D.C.

See also listing under "Sponsoring agency keyword codes."

# Data

Reports containing large amounts of tabular data are tagged by the keywords "Tables (Data)" or "Statistical data."

***Hint:*** *Use the descriptor "Mathematical tables" to limit data searches.*

# Delimited/Declassified Reports

Declassified materials and reports with limited distribution status are added to the NTIS Database with the date it was acquired by NTIS, rather than the date the report was prepared. Generally the phrase, "Distribution limitation now removed" will be included in the Supplemental Notes in any record for declassified / delimited materials.

### Department of Defense (DoD) Declassified/ Delimited Items

Declassified reports from the Department of Defense contain a special searchable code in the identifier field: NTISDODXA, NTISDODXB, NTISDODXD, etc. Using this code as a search term restricts a search to declassified reports, or, alternatively, to ensure that no such reports are included in the final search results. Between 1975 and 1977, more than 30,000 declassified items were added to the database. After 1977, NTIS receives documents from DOD as they are declassified. It is advisable to look for the phrase, "Distribution limitation now removed" on DOD reports in addition to the code.

# Developing Countries

NTIS announces reports for and about developing countries. Since 1979, NTIS has used the descriptor "developing country application" for titles relevant to foreign governments. Reports about a developing country are usually indexed with one of the following descriptors: "developing countries" or "developing nations." See also subject category code 96G and 96H.

# Environmental Impact Statements (EIS)

Environmental Impact Statements are the environmental reviews required for major federal projects that might adversely affect the environment. All previously released EIS were announced through the NTIS Database beginning with the June 1, 1971 update and ending with the April 15, 1974 update. Since then, NTIS has received irregular shipments of EIS.

Most of these environmental impact statements can be searched by entering the term, "environmental impact statements-Final" or "environmental impact statements-Draft" in the descriptor or identifier field. Some early EIS were not assigned either of these terms; however, they can be retrieved by searching for the prefix "EIS" as part of the NTIS accession / order number, truncating after the first three characters of the number, and using the appropriate field qualifier.

Another method of selecting EIS is to use the NTIS subject category code Environmental Impact Statements, 68H.

> ***Note:*** *This subcategory has only been used since March 15, 1973.*

# Foreign Language

In 1979, NTIS created a field to classify reports written in a language other than English. Prior to 1979, reports in foreign languages were mentioned in the notes field. English cannot be searched directly.

### Reports of Non-U.S. Origin

Country names are assigned in the descriptor or identifier fields. Using a country name in the descriptor or identifier field searches for reports *about* that country.

Country names in citations prior to 1980 indicate that the document either *originated* in that country or that the document is *about* that country. In 1980, a field for country of publication was added to the bibliographic citation when the source country was other than United States. Since country codes are not assigned to documents originating in the United States, non-U.S. items can be eliminated using NOT logic.

> ***Note:*** *each online supplier provides search instructions for documents originating in the United States.*

### Foreign Research and Technology

In 1979, NTIS began using the subject term "foreign technology" to identify documents about current foreign research, techniques, and technology. Many of these reports have been prepared outside of the U.S., and include documents published as a result of fellowships or research programs awarded to foreign nationals and sponsored by U.S. government agencies.

### International Business Information

The NTIS Database contains a substantial amount of non-U.S. business-related information especially in the areas of science, engineering and technology. Reports include foreign market surveys, foreign sectoral analysis, industry subsector analysis, and other economic studies. Key sources of this type of information are: the U.S. Trade and Development Program, the International Trade Administration, and the Department of Commerce's Office of General Counsel. NTIS also maintains an outreach program through its Office of Governmental and International Affairs.

Titles are posted with "export trade information" and / or "foreign marketing" identifiers.

> ***Note:*** *The terms foreign marketing and foreign technology are different. For example, tourism doesn't have a technology component, but it does have a marketing component.*

See also listing under "translations."

# Geographical Areas

Geographic location is included only when it is an important facet of an indexed item.

The following indexing guidelines apply:

1. Items referring to an area in a country covering two or more states or provinces are indexed to the region and not the individual states or provinces:

   **Example:** Central Regions (United States)
   Great Plains Region (United States)
   New England (exception-region not included)

2. Reports referring to individual states, provinces, or parts of states within a country are indexed to the states, provinces, and its parent political unit:

   **Example**: Northwest Region (Iowa)
   Ozark Region (Missouri)
   Northern Region (Virginia)

3. States and other political regions, including cities, are modified with the country name except for those of Great Britain, Canada and the United States. They may be posted in the descriptor or identifier field.

   **Example:** Arkansas
   Bavaria Region (Germany)
   British Columbia

4. Coasts are modified with the country or land area and posted in the identifier field:

   **Example:** Atlantic Coast (United States)
   Atlantic Coast (Canada)
   Gulf Coast (United States)
   Pacific Coast (Mexico)

5. Natural features, other than coasts, do not receive a political modifier. The natural feature modifier appears last and is posted in the descriptor field.

   **Example:** Mississippi Delta
   Susquehanna River Basin
   Mexico Gulf (for Gulf of Mexico)

6. Lakes and mountains appear as they are listed on standard maps. They are posted in the descriptor field.

   **Example:** Alps Mountains (Europe)
   Lake Erie
   Great Salt Lake

# Government-Owned Inventions for Licensing (See also Patents)

Effective with NTIS Database GRA&I Issue 72-23 (Dec. 1, 1972), NTIS began to announce all patents and patent applications issued to U.S. government agencies that are available for public licensing.

> *Hint: U.S. government-owned applications can be searched by combining the terms "patents" or "patent applications" with NTIS Subject Category 90. If NTIS subject category 90 is not combined with either of these terms, foreign patents will also be retrieved.*

# Health Care/Medicine Subjects

Since 1980, NTIS has used the National Library of Medicine's thesaurus, *Medical Subject Headings-Annotated Alphabetic Listing*, as its indexing authority for reports in the health care and medicine fields. The subject categories specific to this subject are:

- Medicine & Biology (57);
- Health Care (44); and
- Biomedical Technology and Human Factors Engineering (95).

Three subcategories specific to this subject are:

- Urban and Regional Technology and Development–Health Services (91F);
- Problem Solving for State and Local Governments–Human resources (43C); and Police, Fire and Emergency Services (43D).

# Journal Reprints

NTIS receives and announces between 4,000 and 5,000 journal reprints each year. About half of these articles are originated by the U.S. Department of Defense; others are from the National Institute of Standards and Technology (formerly National Bureau of Standards) and the Environmental Protection Agency.

Some journal articles are available from NTIS depending upon the funding agency. Beginning with NTIS Bibliographic Database GRA&I issue 75-03, February 1975, the descriptor "reprints" has been assigned to the majority of the reprints. The document type is also noted as a journal article.

# Maps

The descriptor "maps" is used whenever maps are an integral part of a report. Reports describing the way maps are made are indexed with the descriptor "mapping."

# Patents

All U.S. government patents and patent applications entered into the NTIS Database are assigned either "patents" or "patent applications" in the descriptor or title note field. Some online vendors display it as the document type field.

# Sponsoring Agency Keyword Acronyms

Effective with NTIS Bibliographic Database issue 7309, May 1973, NTIS placed an acronym representing the report's sponsoring organization(s) in the identifier field. This information can also be found by entering the agency name as a search term in the corporate source / sponsoring agency field.

Beginning with NTIS Bibliographic Database issue 7419, October 1974, the agency acronyms are prefixed with the "NTIS" acronym.

**Examples:**

| | |
|---|---|
| NTISDE | Department of Energy |
| NTISDOD | Department of Defense |
| NTISNASA | NASA |
| NTISCOMNBS | National Institute of Standards & Technology (NIST). |

***Note:*** *This acronym combines the Department of Commerce and the former agency name of National Bureau of Standards (NBS)]*

These codes are helpful when searching for sponsoring organizations rather than performing organizations, or to find all reports submitted to NTIS by one specific agency.

*Note: Although a complete list of these source agency acronyms is not available, the meaning of an agency acronym often may be determined from the corporate source field.*

# Superfund

The U.S. Environmental Protection Agency (EPA) administers the Superfund program, which was established in 1980 with the passage of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In 1986, Congress passed the Superfund Amendment and Reauthorization Act (SARA) which updated and improved CERCLA.

All publicly available documents from the Office of Emergency and Remedial Response (OERR) are available from NTIS.

*Hint: Use the descriptor "Superfund" to locate relevant documents, such as Superfund Record of Decision reports.*

# Translations

Each year, NTIS announces approximately 400 translations received from and funded by government agencies. Prior to 1976, all translations, except those originating with DOE and NASA, were assigned the descriptor "translations." Since 1976, DOE and NASA translations also have been indexed with "translations."

See also listing under "foreign language."

# Verbalization

All subscripts, superscripts, Greek letters, scientific and mathematical formulae are fully spelled out in the abstract of the record.

**Example**: alpha, beta, gamma, etc.
Peroxide appears as H2O2 or H sub 2 O sub 2.
Water appears as H2O or H sub 2 O

# Data Star (the DIALOG Corporation)

http://www.dialog.com

Telephone: (800) 334-2564
Fax: (215) 587-2147

Database Label: NTIS
Years Online: NTIS–October 1980–to date
NT80–1975 to September 1980
NT74–1970 to 1974
NTZZ–All of NTIS since 1970
Update frequency: Monthly

New System Features:

- MAP–extracts and saves terms to use in another database
- RANK–statistical analysis of search results
- Left-hand truncation on Imsmarq trademark databases
- Telecommunications link to DIALOG
- Prompted offline print and alert requests
- Smart Alerts–you choose the day the Alerts run
- KWIC print format–see search terms in context
- Subaccount expanded to 16 characters

## List of Selected Data-Star Search Commands

| *Label* | *Description* | *Example* |
|---|---|---|
| AN | Accession No. | 1_: PB90 ADJ 100041 ADJ XAD.AN. |
| AU | Author | 2_: ABERNATHY-$.AU. |
| IN | Corporate Source | 3_: MINERAL$ ADJ MANAGEMENT.IN. |
| TI | Title | 4_: DRILLING WITH OIL$ ADJ SPILL$.TI. |
| YR | Year | 5_: 89.YR. |
| JN | Journal Announcement Code | 6_: U9002.JN. |
| RN | Report No. | 7_: OCS ADJ EIS ADJ EA ADJ MMS$.RN. |
| PR | NTIS Prices | —Display only— |
| CC | Subject Category | 8_: 68D.CC. |
| MJ | Major Descriptors | 9_: OFFSHORE-DRILLING.MJ. |
| MN | Minor Descriptors | 10_: WATER-POLLUTION.MN. |
| ID | Identifier | 11_: NTISDIMMS.ID.<br>12_: OIL-SPILLS.ID. |
| AB | Abstract | 13_: GAS SAME ENVIRON$4.AB. |
| **Additional Paragraphs** | | |
| TA | Title Annotation | 14_: ANNUAL WITH REPORT.TA. |
| DE | Descriptor Superlabel | 15_: OFFSHORE ADJ DRILLING.DE. |
| AV | Availability | —Display only— |
| SN | Sponsoring Agency | —Display only— |
| NT | Title or Supplementary Note | —Display only—- |
| **Limit Options** | | |
| UP | Update code | 1_: OFFSHORE DRILLING<br>2_: ..L 1 UP>PB89 |
| JN | Journal announcement code | 3_: ..L 1 JN=U |
| JNYR | Journal announcement code/year | 4_: ..L 1 JNYR>89 |
| YR | Year | 5_: ..L 1 YR>88 |

| Print Formats | | |
|---|---|---|
| SHORT | AN AU TI YR TA | -: ..P SHORT / 1-5 |
| MEDIUM | AN AU TI YR TA AB | -: ..P MEDIUM / 1-10 |
| LONG | AN AU TI YR TA AB DE | -: ..P LONG / 2,6,9 |
| By paragraph | (e.g., Title) | -: ..P TI / 1-5 |
| Full document | All paragraphs | -: ..P ALL / 1-10 |

***Note:*** *There is no free format for this database.*

**RANK** counts the occurrences of unique terms within a specific field from a search set you have created.

**MAP** automatically extracts and saves data from selected fields of a set of records, thereby eliminating time-consuming scanning and re-keying. The stored search may then be executed in another database, or saved for later use.

| Sample Record–Data-Star | | |
|---|---|---|
| AN | PB94-887635XAB | Accession No. / Order No. |
| IN | NERAC, Inc., Tolland, CT<br>*National Technical Information Service<br>Springfield, Va. | Corporate Source |
| Code | 103588000 | Performing Organization Code |
| TI | Sediment-Water Interactions<br>and Their Effects Upon Water Quality | Title of the Report |
| NT | Published Search. Updated with each order.<br>Supersedes PB94-851268. | Title or Supplementary Note |
| | Sponsored in part by National Technical<br>Information Service, Springfield, Va. | Sponsoring Agency |
| YR | Jul 94. 182 Citations Minimum | Report date, pagination |
| JN | u9420 | Journal announcement code |
| PR | PC N01 / MF N01 (display only) | NTIS paper copy price code |
| CC | 68C*, 68D*, 88E | Subject Category Codes |
| MJ | Bibliographies, Water-quality,<br>Water-pollution, Fresh-water. | Major Subject Descriptors: |
| MN | Rivers, Water-chemistry, Sediment-transport,<br>Contaminants, Toxicity. | Minor Subject Descriptors |
| ID | Sediment-water-interactions, Published-Searches,<br>Contaminated-sediments | Identifiers (keywords that<br>are not controlled) |
| | NTISNTISN, NTISNERACD. | Sponsoring agency acronyms |
| AB | The bibliography contains citations concerning the testing and evaluation of fresh-water sediments. Citations discuss assessment and remediation of contaminated sediments, monitoring systems, sediment transport, water pollution effects, water traffic, habitats and fisheries, and the effect of dredging operations. National programs, acts, regulations, and criteria are examined. (Contains a minimum of 182 citations, a subject term index and title list.) | Abstract |

# the DIALOG Corporation

http://www.dialog.com

**Print Options**
User-defined formats: can be specified using the display codes indicated in the search options tables, e.g., TYPE S3/TI, JN, PY/1-5.

## Predefined Format Options

| *Number* | *Record Content* |
|---|---|
| Format 1 | DIALOG accession number |
| Format 2 | Full record except abstract |
| Format 3 | Bibliographic citation |
| Format 4 | Full record with tagged fields |
| Format 5, 9 | Full record |
| Format 6 | Title |
| Format 7 | Bibliographic citation and abstract |
| Format 8 | Title and indexing |

*Note: Menu mode is also available*

## List of Selected DIALOG Search Commands

| *Command* | *Explanation* | *Example* |
|---|---|---|
| Begin | To connect to NTIS file | B6 |
| S term | Search term | smedia |
| E term | Expand term: displays online index in alpha order around search term | emedia |
| T or D | To view online results using one of Dialog's eight formats | t5/3/1-4 |
| PR | To print off-line search results | pr5/3/1-4 |
| PR- | To cancel off-line prints | pr-p002 |
| AND, OR, NOT | Logical connectors | |
| (w)(1w) | Proximity connectors | |
| (n)(1n) | Proximity connectors | |
| (f) | Proximity connectors | field |
| (l) | Proximity connectors | descriptors |
| (s) | Proximity connectors | subfield |
| SAVETEMP | To save search strategy for 7 days | savetemp |
| SAVE | To save search strategy permanently | save |
| EXS | To run a saved search | exs sa001 |
| LOGOFF HOLD | To save a search for 30 minutes | |
| RECALL | To list search saves | recall save |
| RELEASE | To purge search saves | release save |
| HELP | To explain system commands and file structure<br>file price list<br>Limit by years | help file6;<br>help field6<br>help rates6<br>help limit6 |
| DS | To display search history<br>To display selected sets | DS3; DS 1-10 |
| SORT | To sort search results by title, etc. | sort s1/all/ti |
| NTIS price code tables | Paper/Microfiche<br>Paper copy exception<br>Diskettes<br>Magnetic tape products | helpntiscode;<br>helpntisecod;<br>helpntisdcod;<br>helpntistcod |
| Time & Charges | At logoff & end | save cost |
| RANK<DE> | To analyze term frequency | |
| TARGET | Search using relevance ranking | |

## Sample Record–Dialog

| | | |
|---|---|---|
| DIALOG No. | 1704266 | DIALOG Accession |
| RN | DE93011889XAB | NTIS Accession No. |
| TI | New Challenges in Optical Materials Development. | Title |
| AU | Krupke, W. F. | Personal Author |
| CS | Lawrence Livermore National Lab., CA<br>Corp. Source Codes: 068147000; 9513035. | Corporate Source |
| SP | Sponsor: Department of Energy, Washington, D.C. | Sponsoring Agency |
| RN | Report No.: UCRL-JC-113188; CONF-921047-2<br>Feb 93 9p. (Report date, pagination) | Report No.<br>–display only– |
| LA | English | Language |
| DT | Conference Proceeding | Document Type |
| JA | Journal Announcement: GRAI9320; ERA9340 | Journal Announcement |
| NT | Symposium on optical materials for high-power lasers, Boulder, CO. (United States), 28-30 Oct 1992.<br>Sponsored by Department of Energy, Washington, D.C. | Note |
| NTIS | Prices: PC A02 / MF A01. | –display only– |
| CP | United States | Country of Publication |
| CN | W-7405-Eng-48 | Contract Number |
| AB | The recent emergence of high performance semiconductor laser diodes and diode arrays emitting at wavelengths between 630 and 2300 nm has enabled the demonstration of several novel diode-pumped solid state laser materials. Narrowly, laser diode arrays may be viewed as simple replacements for conventional flash or arc lamp pumps in solid state lasers... (some text omitted) | Abstract |
| DE | *Photodiodes; *Semiconductor lasers. | Descriptors |
| ID | EDB / 426002; *Optical materials;<br>Laser arrays; Nonlinear optics; NTISDE. | Identifiers |
| SH | 49E (Electrotechnology-Optoelectronic Devices and Systems); 46C (Physics-Optics and Lasers). | Section Headings (Subject Categories) |

# Knowledge Express

One Westlakes Drive, Suite 210
Berwyn, Penn. 19312
Telephone: (610) 251-0190
Fax: (610) 251-8001

Knowledge Express provides a subset of the NTIS Bibliographic Database entitled *Federal Laboratory Technologies*, which consists of patent citations, applications, and inventions, mainly developed at federally funded research and development centers. Knowledge Express also provides access to the Federal Research in Progress (FEDRIP) Database.

## List of Selected Knowledge Express Commands

| ***Search*** | |
|---|---|
| **Keyword** | Searches the database of your choice for your search terms. |
| **Hypersearch** | Searches all of the databases at one time for your search terms. |
| **Relevance** | Searches the database of your choice for titles and reports using natural language. Boolean operators are not functional in this mode. Report results are ranked from most to least relevant. |
| **Hyperrelevance** | Searches other databases to find related reports by using the entire abstract of a report. Results are ranked from most to least relevant. |

## Searchable Fields In Federal Laboratory Technologies

| | | |
|---|---|---|
| **Research Site** | **Inventors** | **Title** |
| **Description** | **Application** | **Advantages** |
| **Patent Status** | **Inquiries To** | **Reference No** |
| **License Terms** | **Category** | **Source** |
| **Major Keywords** | **Minor Keywords** | |

## Sample Record–Knowledge Express–Federal Laboratory Technologies Database

| | |
|---|---|
| RESEARCH SITE | Solar Energy Research Inst., Golden, CO<br>*Department of Energy. Washington, D.C. |
| INVENTOR(S) | by G. J. Jorgensen, M. Carasso, T. J. Wendelin,<br>and A. A. Lewandowski. |
| TITLE | Method and Apparatus for Uniformly Concentrating Solar Flux for Photovoltaic Applications. |
| APPLICATION | This invention is comprised of a dish reflector and method for concentrating moderate solar flux uniformly on a target plane on a solar cell array, the dish having a stepped reflective surface that is characterized by a plurality of ring-like segments arranged about a common axis, and each segment having a concave spherical configuration. |
| INQUIRIES TO | Patent Application. |
| REFERENCE NO. | Copy available from NTIS: Price code N03. Order from the National Technical Information Service, Springfield, Va. 22161; (703) 487-4600. For those interested in licensing this technology, contact Robert Marchick, Patent Licensing, DOE, Room 6F067, 1000 Independence Ave., S.W., Washington, D.C., 20545; (202) 252-2806. |
| CATEGORY | 97N (Solar energy), 90H (Optics and lasers) |
| Keyword(s) | (LASERS) |
| MAJOR KEYWORDS | Patent applications, Solar Reflectors |
| MINOR KEYWORDS | Applications, Reflectors, Design, Inventions, Optical Systems, Systems, Solar Cell Arrays, Cell Arrays, Arrays, Spherical Configuration, Configuration, EDB/141000. |
| OTHER | PAT-APPL-7-712 812 9402/n9353 Filed 1991. |
| Database | Federal Applied Technology Database–NTIS |
| End of Report | (Load Date: 9/21/94) |

# Ovid Technologies

http://www.ovid.com
New York, NY
Telephone: (800) 950-2035;
In New York City: (212) 563-3006;
Fax: (212) 563-3784

Coverage: 1970 to present

Document Delivery: Document availability from NTIS is indicated in each citation.

## List of Selected Ovid Search Commands

**Record Structure**

| *Label* | *Field* | *Function* | *Examples* |
|---|---|---|---|
| AN | Accession No. | Search | tib-b89-82561-xab.an |
| UP | Update Code | Search<br>limit | 9406.up<br>..1/1 up = 9406 |
| AU | Author | Search | strueder, L.au<br>strueder, $.au |
| IN | Institution and<br>Institution Code | Search | computer applications.in<br>ij535353.in |
| TI | Title | Search | eigenvalue problem.ti |
| TA | Title Annotation | | –display only– |
| NT | Notes | | –display only– |
| YR | Publication Year | Search<br>limit | nov 1993.yr., 1993.yr<br>..L/ 2 yr = 1993 |
| JN | Journal Announcement | Search | u9006.jn |
| SA | Sponsoring Agency | Search | nasa-cr-194662.sa<br>nasa.sa |
| RN | Report Number | Search | mpi-pae-exp-el-208.m |
| CN | Contract and/or<br>Grant Numbers | Search | nasi-18605.cn |
| PN | Project and/or<br>Task Numbers | | –display only– |
| PR | Price | | –display only– |
| AV | Availability | | –display only– |
| CC | Subject Category Codes | Search | 89d.cc. and 72b.cc |
| MJ | Major Descriptors | Search | problem solving.mj |
| MN | Minor Descriptors | Search | energy resolution.mn |
| DE | Descriptors<br>(MJ,MN) | Search | algorithms.de<br>reacting flow.de |
| ID | Identifiers | Search | ntisnasa.id |
| AB | Abstract | Search | supersonic<br>combustion.ab |

| Print Options: | |
|---|---|
| BIBL Fields for Ovid Online | AN, UP, AU, TI, YR, RN, CN |
| Display Formats for Ovid Colleague: | |
| Short | AN, UP, AU, TI, NT |
| Medium | AN, UP, AU, TI, NT, DE |
| Long | All Fields |
| Default Fields for unqualified searches | TI, AB, MJ, MN |

| Sample Record–Ovid Technologies | |
|---|---|
| AN | N94-17216-2-XAB |
| UP | 9406 |
| AU | TIWARI SN. CHANDRASEKHAR R. |
| IN | OLD DOMINION UNIV., NORFOLK, VA. NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C. 045163000 OS853217 |
| TI | STUDIES ON NONEQUILIBRIUM PHENOMENA IN SUPERSONIC CHEMICALLY REACTING FLOWS. |
| NT | PROGRESS REPORT FOR PERIOD ENDING 31 AUG. 1993. (139 PAGES) |
| YR | NOV 1993 |
| JN | S3203 |
| SA | NASA-CR-194662 |
| RN | NAS-1-26-194662 |
| CN | NAG1-423 |
| PR | PC A07 / MF A02 |
| CC | 46B. 81A |
| MJ | COMPUTATIONAL-FLUID-DYNAMICS, FLOW DISTRIBUTION, NONEQUILIBRIUM-FLOW, REACTING-FLOW, SUPERSONIC-COMBUSTION. |
| MN | CHEMICAL-REACTIONS, RADIATIVE-HEAT-TRANSFER, SUPERSONIC-NOZZLES, TEMPERATURE-EFFECTS, ELLIPTIC-DIFFERENTIAL-EQUATIONS, FINITE-DIFFERENCE-THEORY, NAVIER-STOKES-EQUATION, NONEQUILIBRIUM-THERMODYNAMICS, PEROXIDES, PREMIXING, SUPERSONIC-COMBUSTION-RAMJET-ENGINES, SUPERSONIC-JET-FLOW, TURBULENT-MIXING. |
| ID | NTISNASA |
| AB | THIS STUDY DEALS WITH A SYSTEMATIC INVESTIGATION OF NONEQUILIBRIUM PROCESSES IN SUPERSONIC COMBUSTION. THE TWO-DIMENSIONAL, ELLIPTIC NAVIER-STOKES EQUATIONS ARE USED TO INVESTIGATE SUPERSONIC FLOWS WITH NONEQUILIBRIUM CHEMISTRY AND THERMODYNAMICS, COUPLED WITH RADIATION, FOR HYDROGEN-AIR SYSTEMS. THE EXPLICIT UNSPLIT MACCORMACK FINITE-DIFFERENCE SCHEME IS USED TO ADVANCE THE GOVERNING EQUATIONS IN TIME, UNTIL CONVERGENCE IS ACHIEVED... (Some text omitted) |

# QUESTEL-ORBIT

http://www.questel.orbit.com

Update: bi-weekly
Years of Coverage:
NTIM–1964 to present
NTIS–1977 to present
NTBK–1964 to 1977

## List of Selected Orbit Commands

| *Function* | *Command* | *Example* |
|---|---|---|
| Entering Files | File filename | file ntis |
| Searching Terms<br>simply enter term. | No command necessary: | economics |
| **Proximity Operators** | | |
| Adjacency | | |
| Specified | (nW) | thermal () conductivity |
| Any | (nN) | computer (3n) model |
| Sentence | (s) | fiber (s) optics |
| Field | (f) | international (f) trade |
| **Truncation** | | |
| Right hand | : | conductiv: |
| Zero or one | # | fiber () optic# |
| Exactly one | #(used internally) | fib## () optic# |
| Searching specific fields | /pre- or post-qualify | /ti thermal () expansion |
| Browsing the Basic Index | NBR term | nbr economic |
| Browsing a Specified Index | NBR term field | nbr perkins, r/au |
| **Displaying Records** | | |
| Online | PRT | prt 1-10 |
| Off-line | PRT OFFLINE | prt off-line set |
| Electronic | PRT ELEC | prt elec ss1 |
| History of a Search Session | HIS | his |
| Extract Terms into Memory | PRT SEL | prt sel au 1-10 |
| Statistical Analysis of a Set | GET | get au top 10 |
| Saving a Temporary Search | SAVE searchname | save media |
| Saving a Permanent Search | STORE searchname | store fiber optics |
| Executing a Search | RECALL searchname<br>(erases all existing search statements) | recall media |
| | EXECUTE searchname<br>(maintains all existing search statements) | execute fiber optics |
| Erasing Search Statements | REMOVE | remove 1-3 |
| Displaying Search Session Costs | COST | cost |
| Displaying File Session | COST FILE | cost file |
| Ending a Search Session | Stop Y | stop y |

| Print Formats | |
|---|---|
| PRINT MIN | AN TI |
| PRINT SUBJ | AN TI CC IT |
| PRINT | AN TI AU OS SO RN PN |
| PRINT FULL | AN TI AU OS SPN SO IS PR LA DT RP CG CC IT AB PN PJN TN PY |

**Special Features**

PowerIndex locates applicable databases; builds low cost search strategies; and automatically re-runs your refined logic in PowerSearch.

PowerSearch allows users to open and close multiple databases, save searches without losing results, and merge results into one location to eliminate post processing.

| Sample Record–Questel•Orbit | | |
|---|---|---|
| AN | PB95123915/XAB | Accession Number |
| TI | Development and Selection of Ammonia Emission Factors | Title |
| AU | Battye, R.; Battye, W.; Overcash, C.; Fudge, S. | Personal Authors |
| OS | EC/R, Inc., Durham, N.C.; *Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Research and Exposure Assessment Lab. | Organizational Source |
| SPN | EPA/600/R 94/190; 108938000 | Sponsor Number |
| SO | Aug 94; 114p. See also PB90-235094. Sponsored by Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Research and Exposure Assessment Lab. | Source |
| IS | u9501 | Journal Announcement Issue |
| PR | NTIS Prices: PC A06 / MF A02 | NTIS Price Code |
| LA | English | Language |
| DT | Final rept. Feb–Aug. 94 | Document Type |
| CG | EPA-68-D3-0034 | Contract/Grant Number |
| CC | 68A (ENVIRONMENTAL POLLUTION & CONTROL-Air pollution and control) | Subject Codes |
| IT | *Ammonia; *Air pollution; *Emission factors; Inventories; Industrial wastes; Acid rain; Animal husbandry; Agricultural products; Livestock; Pollution sources; United States; Europe; Australia; Ammonium nitrate; Study estimates; Biomass; Sewage treatment; *Emission inventories; Comprehensive planning; National Acid Precipitation Program. | IndexTerms |
| AB | This report compiles recent literature on ammonia (NH3) emission factors for application in the United States. Most of the recent research supports acid deposition studies in the European Community (specifically, the Netherlands, Great Britain, and Scandinavia) but some research has been conducted in Australia... Some inventories exclude industrial emissions entirely because they are insignificant relative to agricultural sources. Global climate change research indicates that undisturbed soils and biomass burning may also have significant emissions, up to half of the global NH3 budget. | Abstract |
| PY | 94 | Publication Year |

# SilverPlatter Information, Inc.

100 River Ridge Drive
Norwood, MA 02062-5043
Telephone: (800)343-0064
http://www.silverplatter.com

Below are the NTIS fields with their abbreviation. Fields listed in bold are limit fields.

## List of Selected SilverPlatter Search Fields

| *Label* | *Field Name* |
|---|---|
| AB | Abstract |
| AG | Agency Source Code |
| AN | Accession Number |
| AU | Personal Author |
| AV | Availability Note* |
| CA | Corporate Author Code |
| CC | Subject Category Codes |
| CI | Country of Intellectual Origin |
| CN | Contract/Grant Number(s) |
| CS | Corporate Source |
| DE | Descriptors |
| DEM | Major Descriptors |
| DER | Minor Descriptors |
| ID | Identifiers |
| IDM | Major Identifiers |
| IDR | Minor Identifiers |
| LA | Language |
| NT | Descriptive Note* |
| PR | NTIS Price Codes* |
| PY | Publication Year |
| RD | Report Date/Pagination* |
| RN | Report Number |
| SC | Subject Categories |
| TI | Title |
| UD | Update Date |

* The AV, NT, PR, and RD fields are not searchable. The citation, a brief record, consists of the TI, AN, CS, RD, NT, AV, PR, RN, and CN fields. For more on NTIS fields, press (F3) GUIDE or select Guide from the Help menu.

## Sample Record - SilverPlatter

| | | |
|---|---|---|
| TI: | Legnocellulosic-Plastic Composites from Recycled Materials. Book Chapter. | Title |
| AN: | PB92126861XSP | Accession Number |
| AU: | Youngquist J.; Myers-G.E.; Harten-T.M. | Personal Authors |
| CS: | Performer: Environmental Protection Agency, Cincinnati, OH. Risk Reduction Engineering Lab.<br>Performer: Forest Products Lab., Madison, WI. | Corporate Source |
| RD: | 1992. 18P | Report Date / Pagination |
| PY: | 1992 | Publication Year |
| NT: | Pub. In Emerging Materials and Chemicals from Biomass, American Chemical Society Symposium Series, p42-56 1992.<br>See also PB87-178323. Portions of this document are not fully legible.<br>Prepared cooperation with Forest Products Lab., Madison, WI. | Descriptive Note |
| CI: | UNITED-STATES | Country of Intellectual Origin |
| LA: | ENGLISH | Language |
| PR: | PC A03 / MF A01 | NTIS Price Codes |
| DE: | Processing-; Economic-factors; Test-methods; Paper-industry; Wood-wastes; Polyethylene-; Wood-fibers; Utilization-. | Descriptors |
| DE: | *Lignolcellulose; *Plastics; *Composite-fabrication; *Recycled-materials; *Waste-management. | Descriptors |
| ID: | Melt-blending; Nonwoven-web. | Identifiers |
| SC: | Environmental-pollution-and-control-Solid-wastes-pollution-and-control (68C)<br>Materials-sciences-Composite-materials (71F);<br>Materials-sciences (71)<br>Industrial-and-mechanical-engineering-Manufacturing-processes-and-materials-handling (94G) | Subject Categories |
| CC: | 68C, 71F, 71, 94G, 68, 94 | Subject Category Codes |
| AB: | Waste wood, waste paper, and waste plastics are major components of MSW and offer great opportunities as recycled ingredients in wood-fiber composites. USEPA and the USDA Forest Products Laboratory (FPL) are collaborating on a research project to investigate the processing, properties, and commercial potential of composites containing these recycled ingredients. Two processing technologies are being employed - melt blending and nonwoven web. Some past research studies are briefly reviewed to illustrate the behavior of wood fiber-polyolefin composites and results of initial testing under the EPA / FPL project are also presented. | Abstract |
| AG: | EPAORD | Agency Source Code |
| CA: | 034122084 | Corporate Source Code |
| RN: | EPA600D91279 | Report Number |
| UD: | 9206 | Update Date |

# STN International

Chemical Abstracts Service
2540 Olentangy River Road
P.O. Box 3012
Columbus, Ohio 43210
Telephone: (800) 848-6533
In Ohio & Canada: (800) 848-6538

**Search Fields**
Terms may be verified with the EXPAND command. Enter EXPAND followed by the search term with the search field code appended, e.g., EWASTE/TI.

## List of Selected STN International Fields

| *Field* | *Code* | *Search Example* |
|---|---|---|
| Basic Index (contains single words from the title, abstract, and controlled and uncontrolled terms) | None (or /BI) | S COAL(S)MINE# |
| Application Number | /AP | S 6376852/AP |
| Author (patent inventor) | /AU | S MCCARTHY, P E/AU |
| Classification Code<br>(COSATI, NTIS, etc.: code, main code)<br>(NTIS) and text | /CC | S 85/CC<br>S *57E/CC<br>S (GROUP(W)BEHAVIOR) |
| Controlled Terms<br>(includes main headings) | /CT | S ALCOHOL LAWS/CT<br>S *HEAT RECOVERY/CT |
| Corporate Source (performing, sponsoring or cooperating performing organization, patent assignee) | /CS | S (DEPART?(2W) INTERIOR)/CS |
| Country of Intellectual Origin (code/text) | /CY | S GERMANY?/CY |
| Language (code and text) | /LA | S ENGLISH/LA |
| Number of Contract (grant, project, or task) | /NC | S AID-DSAN-C-0063/NC |
| Number of Report<br>NTIS Order Number (number and prefix) | /NR | S PB85-138436!XAD/NR |
| Other Sources<br>(journal and database issue) | /OS | S GRA&I8507/OS<br>S GREENHOUSE# NOT INIS/OS |
| Patent Number | /PN | S 4387655/PN |
| Publication Date | /PD | S 810501/PD |
| Publication Year | /PY | S 1993-1994/PY |
| Source (contains number of contract, number of report) | /SO | S TRRLSR826/SO |
| Title | /TI | S METHOD?/TI |
| Update Date | /UP | S UP>910100 |

## List of Selected STN Commands

| *Command* | *Function* | *Example* |
|---|---|---|
| FILE | Enter the NTIS database | FILE NTIS |
| EXPAND | Verify terms in the search index | E MEDIA |
| SEARCH | Search the database | S MEDIA |
| DISPLAY | Display answers online | D |
| PRINT | Print search results | PRINT 1-ALL |

## Proximity and Boolean Operators

| *Operator* | *Function* |
|---|---|
| (W) | Terms must be adjacent in order specified |
| (nW) | Terms must be adjacent with n or fewer intervening words, in the order specified |
| (A) | Terms must be adjacent in either order |
| (nA) | Terms must be adjacent with n or fewer intervening words, in the either order |
| (L) | Terms must be in same field |

## Truncation

| *Symbols* | *Function* |
|---|---|
| ? | Retrieves stem followed by any number of characters including none |
| # | Retrieves stem followed by one or zero characters |
| ! | Masking character |

## HELP Messages

| *Messages* | *Content* |
|---|---|
| HELP DIRECTORY | Lists all file-specific helps |
| HELP CONTENT | Overview of database content |
| HELP COST | Cost of using NTIS |
| HELP FORMAT | Display formats |
| HELP SFIELD | NTIS search fields |
| HELP MESSAGES | Lists system messages |

**Display and Print Formats**

Any combination of field codes and / or formats may be used to display answers online or print answers off-line or deliver them to an electronic mailbox. The fields are displayed or printed in the order requested.

| *Field* | *Content* |
|---|---|
| ALL | Entire record: Bibliographic Information, Abstract, Classification Codes, Controlled and Uncontrolled Terms |
| BIB | Bibliographic information: Accession (BIB is the default display format)Number, Title, Author, Corporate Source, Contract Number, Report Number, Publication Date, Language, Country of Intellectual Origin, Other Sources |
| TRIAL | Free format: Title, Classification Codes, Controlled and Uncontrolled terms |

## Sample Record–STN International

| *Code* | *Example* |
|---|---|
| AN | 94(21):2550 NTIS Order Number: PB94-193323 / XAB |
| TI | Bicarbonate of Soda Blasting Technology for Aircraft Wheel Depainting. (Project rept. June 91-May 92.) |
| AU | Chen, A. S. C.; Smith, L.A.; Olfenbuttel, R.F. |
| CS | Battelle, Columbus, Ohio<br>Sponsor: Environmental Protection Agency, Cincinnati, Ohio.<br>Risk Reduction Engineering Lab (098156000) |
| NC | Contract: EPA-68-C0-0003 |
| NR | PB94-193323 / XAB; EPA / 600 / R-94 / 127 82p. NTIS Prices: PC A05 / MF A01<br>(Notes: Sponsored by Environmental Protection Agency, Cincinnati, Ohio.<br>Risk Reduction Engineering Lab.) |
| PD | July 1994 |
| LA | English |
| CY | United States |
| OS | GRA&I9421 |
| AB | This evaluation addressed product quality, waste reduction / pollution prevention and economics in replacing chemical solvent strippers with a bicarbonate of soda blasting technology for removal of paint from aircraft wheels...Analyses for Cd, Cr, Cu, Pb, Mn, Ni, and Zn were made as well as total metals concentrations, pH, total suspended solids, and oil and grease... In comparison to solvent depainting this technology reduced the amount of hazardous waste generated as well as cost savings due to operating and disposal costs, resulting in a 15% return on investment in about four years. |
| CC | 68C Solid wastes pollution and control 71E Coatings, colorants, and finishes 51C Aircraft |
| CT | *Stripping; *Pollution abatement; *Hazardous materials; *Blasting; *Paints; Alternatives; Aircraft; Economic analysis; Quality assurance; Performance evaluation; *Bicarbonate soda blasting; ARMEX / ACCUSTRIP process |
| UT | NTISEPAORD |

# SELECTED REFERENCES FOR NTIS BIBLIOGRAPHIC DATABASE USAGE

## APPENDIX A

***Codes for the Representation of Names of Countries.***
International Standard Organization Publication. ISO 3166 Maintenance Agency Secretariat, c/o DIN Deutsches Institut fur Normung, Burggrafenstrasse 6, Postfach 1107, D-1000 Berlin 30 GERMANY.

***Countries, Dependencies and Areas of Special Sovereignty:*** **and Their Principal Administrative Divisions**
U.S. Dept. of Commerce, NTIS, Springfield, Va., 22161.
NTIS Order No.: FIPS-PUB-10-4. $29.00.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***Guidelines for Descriptive Cataloging of Reports: A Revision of COSATI Standard for Descriptive Cataloging of Government Scientific and Technical Reports.***
U.S. Dept. of Commerce, NTIS, Springfield, Va., 22161.
NTIS Order No.: PB86-112349XAB. $36.50.

***NTIS: DIALOG Information Services, Inc. (File 6).***
DIALOG Information Services, Inc., 2440 El Camino Real, Mountain View, Calif., 94040. Includes field-by-field description of DIALOG system search capabilities.

***NTIS Subject Classification (Past and Present).***
1978. U.S. Dept. of Commerce, NTIS, Springfield, Va., 22161. January 1978.
NTIS Order No.: PB-270575XAB. $34.
(To Order: 703-605-6000 / Fax: 703-605-6900)

Other guidelines and references applicable to subject analysis are listed below.

***USAN and the USP Dictionary of Drug Names. (Updated annually).***
United States Pharmacopoeial Convention, Inc., 12601 Twinbrook Parkway, Rockville, Md., 20852.

### List of applicable thesauri

***Computer Sciences Microthesaurus. A Hierarchical List of Index Terms Used by NTIS.***
November 1980. U.S. Dept. of Commerce, NTIS, Springfield, Va., 22161. Lists more than 800 computer science terms used by NTIS, Dept. of Defense, Dept. of Energy, and National Aeronautics and Space Administration along with a complete hierarchy for each item.
NTIS Order No.: PB80-207814XAB. $26.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***Defense Technical Information Center Thesaurus.***
1993. Defense Technical Information Center, Alexandria, Va. October 1993. Available from U.S. Dept. of Commerce, NTIS, Springfield, Va., 22161.
NTIS Order No.: AD-A 268 855. $103.50.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***Environmental Microthesaurus–A Hierarchical List of Indexing Terms Used by NTIS.***
1977. U.S. Dept. of Commerce, NTIS, Springfield, Va., 22161. Lists keywords from the "Major Thesauri" as well as free-language keywords for air pollution, noise pollution, water pollution, and solid waste disposal.
NTIS Order No.: PB-265261XAB. $32.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***Health Care Microthesaurus.–A Hierarchical List of Indexing Terms used by NTIS.***
February 1982. U.S. Dept. of Commerce, NTIS, Springfield, Va., 22161.
NTIS Order No.: PB82-131715XAB. $26.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***International Energy Subject Categories and Scope. Revision 2.***
Rutkowski, R. and Kane, L., editors, U.S. Dept. of Commerce, NTIS, Springfield, Va., 22161. Lists subject categories which appear in the Identifier Field of DOE reports.
NTIS Order No.: DE92018520. $31.50.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***International Energy Subject Thesaurus. (Rev. 1).***
1993. U.S. Department of Energy Office of Scientific and Technical Information, the Energy Technology Data Exchange, and the International Nuclear Information System. Oak Ridge, Tenn. DOE Order No.: ETDE / PUB-2.
NTIS Order No.: DE94002590. $176.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***Medical Subject Headings, Annotated Alphabetic List.***
1995. NTIS Order No.: PB95-964801XAB. $49.95
(To Order: 703-605-6000 / Fax: 703-605-6900)

***NASA (National Aeronautics and Space Administration) Thesaurus Supplement: A Four-Part Cumulative Supplement to the 1988 Edition of the NASA Thesaurus. (Supplement 5).***
1991. The four-part supplement to the 1988 edition of the NASA Thesaurus includes: Part 1: Hierarchical Listing, Part 2: Access Vocabulary, Part 3: Definitions, and Part 4: Changes. NASA Order No.: NAS 1.21:7064-SUP-5 or NASA-SP-7064-Sup-5. March 1991.
NTIS Order No.: N91-19962. $28.50. Semiannual supplement.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***NASA Thesaurus Aeronautics Vocabulary.***
1991. January 1991. 221 p.
NTIS Order No.: N91-16847. $54.50.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***NHTSA/SASI Cooperative Thesaurus of Highway and Motor Vehicle Safety Literature Terms.***
1973. U.S. Dept. of Commerce, NTIS, Springfield, Va., 22161.
NTIS Order No.: PB-226 870. $31.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***Social Science and Business Microthesaurus. A Hierarchical List of Indexing Terms Used by NTIS.***
January 1982. Lists more than 2000 terms used by NTIS, Department of Defense, Department of Energy and National Aeronautics and Space Administration along with a complete hierarchy for each term.
NTIS Order No.: PB82-100066XAB. $26.
(To Order: 703-605-6000 / Fax: 703-605-6900)

***TEST: Thesaurus of Engineering and Scientific Terms.***
1967. Available from American Association of Engineering Societies, 415 2nd St., N.E., Suite 200, Washington, D.C., 20002.

***Water Resources Thesaurus. Third Edition.***
1981. U.S. Water Research and Technology.
NTIS Order No.: PB81-198376XAB. $44.
(To Order: 703-605-6000 / Fax: 703-605-6900)

# NTIS SUBJECT CATEGORIES - ALPHABETICAL LISTING BY MAJOR CATEGORIES

## APPENDIX B

### 70-ADMINISTRATION & MANAGEMENT

- 700-General
- 70A-Inventory Control
- 70B-Management Practice
- 70C-Management Information Systems
- 70D-Personnel Management, Labor Relations & Manpower Studies
- 70E-Research Program Administration & Technology Transfer
- 70F-Public Administration & Government
- 70G-Productivity

### 51-AERONAUTICS & AERODYNAMICS

- 510-General
- 51A-Aerodynamics
- 51B-Aeronautics
- 51C-Aircraft
- 51D-Parachutes & Decelerators
- 51E-Avionics
- 51F-Test Facilities & Equipment

### 98-AGRICULTURE & FOOD

- 980-General
- 98A-Agricultural Chemistry
- 98B-Agricultural Economics
- 98C-Agricultural Equipment, Facilities, & Operations
- 98D-Agronomy, Horticulture, & Plant Pathology
- 98E-Animal Husbandry & Veterinary Medicine
- 98F-Fisheries & Aquaculture
- 98G-Agriculture Resource Surveys
- 98H-Food Technology

### 54-ASTRONOMY & ASTROPHYSICS

- 540-General
- 54A-Astrogeology
- 54B-Astronomy & Celestial Mechanics
- 54C-Astrophysics
- 54D-Cosmic Ray Research

### 55-ATMOSPHERIC SCIENCES

- 550-General
- 55A-Aeronomy
- 55B-Dynamic Meteorology
- 55C-Meteorological Data Collection, Analysis, & Weather Forecasting
- 55D-Meteorological Instruments & Instrument Platforms
- 55E-Physical Meteorology
- 55F-Weather Modification

### 92-BEHAVIOR & SOCIETY

- 920-General
- 92A-Job Training & Career Development
- 92B-Psychology
- 92C-Social Concerns
- 92D-Education, Law, & Humanities
- 92E-International Relations

### 95-BIOMEDICAL TECHNOLOGY & HUMAN FACTORS ENGINEERING

- 950-General
- 95A-Prosthetics & Mechanical Organs
- 95B-Tissue Preservation & Storage
- 95C-Biomedical Instrumentation & Bioengineering
- 95D-Human Factors Engineering
- 95E-Life Support Systems
- 95F-Bionics & Artificial Intelligence
- 95G-Protective Equipment

### 89-BUILDING INDUSTRY TECHNOLOGY

- 890-General
- 89B-Architectural Design & Environmental Engineering
- 89C-Construction Management & Techniques
- 89D-Structural Analyses
- 89E-Building Standards & Codes

89G-Construction Materials, Components, & Equipment

89H-Building Equipment, Furnishings, & Maintenance

## 96-BUSINESS & ECONOMICS

960-General

96A-Domestic Commerce, Marketing, & Economics

96C-International Commerce, Marketing, & Economics

96D-Consumer Affairs

96E-Minority Enterprises

96F-Banking & Finance

96G-Foreign Industry Economic Development

96H-Foreign Business & Economics

## 99-CHEMISTRY

990-General

99A-Analytical Chemistry

99B-Industrial Chemistry & Chemical Process Engineering

99C-Polymer Chemistry

99D-Basic & Synthetic Chemistry

99E-Photochemistry & Radiation Chemistry

99F-Physical & Theoretical Chemistry

## 50-CIVIL ENGINEERING

500-General

50A-Highway Engineering

50B-Civil Engineering

50C-Construction Equipment, Materials, & Supplies

50D-Soil & Rock Mechanics

## 81-COMBUSTION, ENGINES, & PROPELLANTS

810-General

81A-Combustion & Ignition

81B-Electric & Ion Propulsion

81C-Fuel & Propellant Tanks

81D-Jet & Gas Turbine Engines

81G-Rocket Engines & Motors

81H-Rocket Propellants

81I-Nuclear Propulsion

81J-Reciprocation & Rotating Combustion Engines

## 45-COMMUNICATION

450-General

45A-Policies, Regulations, & Studies

45B-Radio & Television Equipment

45C-Common Carrier & Satellite

45D-Sociopolitical

45E-Graphics

45F-Verbal

45G-Communication & Information Theory

## 62-COMPUTERS, CONTROL & INFORMATION THEORY

620-General

62A-Computer Hardware

62B-Computer Software

62C-Control Systems & Control Theory

62D-Information Processing Standards

62E-Information Theory

62F-Pattern Recognition & Image Processing

62R-Applications Software

62S-Data Files

## 63-DETECTION & COUNTERMEASURES

630-General

63A-Acoustic Detection

63B-Electromagnetic & Acoustic Countermeasures

63C-Infrared & Ultraviolet Detection

63D-Magnetic Detection

63E-Nuclear Explosion Detection

63F-Optical Detection

63G-Personnel Detection

63H-Radiofrequency Detection

63I-Seismic Detection

## 49-ELECTROTECHNOLOGY

490-General

49A-Antennas

49B-Circuits

49C-Electromechanical Devices

49D-Electron Tubes

49E-Optoelectronic Devices & Systems

49F-Power & Signal Transmission Devices

49G-Resistive, Capacitive, & Inductive Components
49H-Semiconductor Devices

## 97-ENERGY

970-General
97A-Reserves
97B-Energy Use, Supply, & Demand
97E-Electric Power Transmission
97F-Fuel Conversion Processes
97G-Policies, Regulations & Studies
97I-Electric Power Production
97J-Heating & Cooling Systems
97K-Fuels
97L-Engine Studies (Energy Related)
97M-Batteries & Components
97N-Solar Energy
97O-Miscellaneous Energy Conversion & Storage
97P-Geothermal Energy
97Q-Selected Studies In Nuclear Technology
97R-Environmental Studies

## 68-ENVIRONMENTAL POLLUTION & CONTROL

680-General
68A-Air Pollution & Control
68B-Noise Pollution & Control
68C-Solid Wastes Pollution & Control
68D-Water Pollution & Control
68E-Pesticides Pollution & Control
68F-Radiation Pollution & Control
68G-Environmental Health & Safety
68H-Environmental Impact Statements

## 90-GOVERNMENT INVENTIONS FOR LICENSING

900-General
90A-Mechanical Devices & Equipment
90B-Chemistry
90C-Nuclear Technology
90D-Biology & Medicine
90E-Metallurgy
90F-Electrotechnology
90G-Instruments
90H-Optics & Lasers
90I-Ordnance
90J-Food Technology

## 44-HEALTH CARE

440-General
44A-Planning Methodology
44B-Agency Administrative & Financial Management
44C-Community & Population Characteristics
44D-Health Care Assessment & Quality Assurance
44E-Health Care Measurement Methodology
44F-Health Care Forecasting Methodology
44G-Environmental & Occupational Factors
44H-Health Care Technology
44J-Health Delivery Plans, Projects & Studies
44K-Health Services
44L-Health Care Needs & Demands
44M-Health Resources
44N-Health Care Utilization
44P-Health Education & Manpower Training
44Q-Health-Related Costs
44R-Economics & Sociology
44S-Legislation & Regulations
44T-Data & Information Systems
44U-Health Care Delivery Organization & Administration

## 94-INDUSTRIAL & MECHANICAL ENGINEERING

940-General
94A-Production Planning & Process Controls
94B-Quality Control & Reliability
94C-Plant Design & Maintenance
94D-Job Environment
94E-Environmental Engineering
94F-Tooling, Machinery, & Tools
94G-Manufacturing Processes & Materials Handling
94H-Industrial Safety Engineering
94I-Hydraulic & Pneumatic Equipment
94J-Nondestructive Testing
94K-Laboratory & Test Facility Design & Operation

## 88-LIBRARY & INFORMATION SCIENCES

- 880-General
- 88A-Operations & Planning
- 88B-Information Systems
- 88C-Marketing & User Services
- 88D-Personnel
- 88E-Reference Materials

## 41-MANUFACTURING TECHNOLOGY

- 410-General
- 41A-Computer Aided Design (CAD)
- 41B-Computer Aided Manufacturing (CAM)
- 41C-Robotics/Robots
- 41D-Productivity
- 41E-Manufacturing, Planning, Processing & Control
- 41F-Joining
- 41G-Quality Control & Reliability
- 41H-Plant Design & Maintenance
- 41I-Job Environment
- 41J-Tooling, Machinery, & Tools
- 41K-Engineering Materials
- 41L-Tribology
- 41M-Optics & Lasers
- 41N-Computer Software
- 41O-Domestic Commerce, Marketing, & Economics
- 41P-Research Program Administration & Technology Transfer

## 71-MATERIALS SCIENCES

- 710-General
- 71A-Ablative Materials & Ablation
- 71B-Adhesives & Sealants
- 71C-Carbon & Graphite
- 71D-Ceramics, Refractories, & Glass
- 71E-Coatings, Colorants, & Finishes
- 71F-Composite Materials
- 71G-Corrosion & Corrosion Inhibition
- 71H-Elastomers
- 71I-Fibers & Textiles
- 71J-Iron & Iron Alloys
- 71K-Lubricants & Hydraulic Fluids
- 71L-Materials Degradation & Fouling
- 71M-Miscellaneous Materials
- 71N-Nonferrous Metals & Alloys
- 71O-Plastics
- 71P-Refractory Metals & Alloys
- 71Q-Solvents, Cleaners, & Abrasives
- 71R-Wood & Paper Products

## 72-MATHEMATICAL SCIENCES

- 720-General
- 72B-Algebra, Analysis, Geometry, & Mathematical Logic
- 72E-Operations Research
- 72F-Statistical Analysis

## 57-MEDICINE & BIOLOGY

- 570-General
- 57A-Anatomy
- 57B-Biochemistry
- 57C-Botany
- 57D-Clinical Chemistry
- 57E-Clinical Medicine
- 57F-Cytology, Genetics, & Molecular Biology
- 57G-Dentistry
- 57H-Ecology
- 57I-Electrophysiology
- 57J-Immunology
- 57K-Microbiology
- 57L-Nutrition
- 57M-Occupational Therapy, Physical Therapy, & Rehabilitation
- 57N-Parasitology
- 57O-Pathology
- 57P-Pest Control
- 57Q-Pharmacology & Pharmacological Chemistry
- 57S-Physiology
- 57T-Psychiatry
- 57U-Public Health & Industrial Medicine
- 57V-Radiobiology
- 57W-Stress Physiology
- 57X-Surgery
- 57Y-Toxicology
- 57Z-Zoology

## 74-MILITARY SCIENCES

- 740-General
- 74A-Antiaircraft Defense Systems
- 74B-Antimissile Defense Systems
- 74C-Antisubmarine Warfare
- 74D-Chemical, Biological, & Radiological Warfare
- 74E-Logistics, Military Facilities, & Supplies
- 74F-Military Intelligence
- 74G-Military Operations, Strategy, & Tactics
- 74H-Nuclear Warfare
- 74I-Passive Defense Systems

## 75-MISSILE TECHNOLOGY

- 750-General
- 75A-Air & Space-Launched Missiles
- 75B-Missile Guidance & Control Systems
- 75C-Missile Launching & Support Systems
- 75D-Missile Tracking Systems
- 75E-Missile Trajectories & Reentry Dynamics
- 75F-Missile Warheads & Fuses
- 75G-Surface-Launched Missiles
- 75H-Underwater-Launched Missiles

## 48-NATURAL RESOURCES & EARTH SCIENCES

- 480-General
- 48A-Mineral Industries
- 48B-Natural Resource Management
- 48C-Natural Resource Surveys
- 48D-Forestry
- 48E-Soil Sciences
- 48F-Geology & Geophysics
- 48G-Hydrology & Limnology
- 48H-Snow, Ice, & Permafrost
- 48I-Cartography

## 76-NAVIGATION, GUIDANCE, & CONTROL

- 760-General
- 76A-Control Devices & Equipment
- 76B-Guidance Systems
- 76C-Navigation & Guidance System Components
- 76D-Navigation Systems

## 77-NUCLEAR SCIENCE & TECHNOLOGY

- 770-General
- 77A-Fusion Devices (Thermonuclear)
- 77B-Isotopes
- 77C-Nuclear Auxiliary Power Systems
- 77D-Nuclear Explosions & Devices
- 77E-Nuclear Instrumentation
- 77F-Radiation Shielding, Protection, & Safety
- 77G-Radioactive Wastes & Radioactivity
- 77H-Reactor Engineering & Nuclear Power Plants
- 77I-Reactor Fuels & Fuel Processing
- 77J-Reactor Materials
- 77K-Reactor Physics

## 47-OCEAN SCIENCES & TECHNOLOGY

- 470-General
- 47A-Marine Engineering
- 47B-Dynamic Oceanography
- 47C-Physical & Chemical Oceanography
- 47D-Biological Oceanography
- 47E-Marine Geophysics & Geology
- 47F-Oceanographic Vessels, Instruments, & Platforms
- 47G-Hydrography
- 47H-Underwater Construction & Habitats

## 79-ORDNANCE

- 790-General
- 79A-Ammunition, Explosives, & Pyrotechnics
- 79B-Armor
- 79C-Bombs
- 79D-Combat Vehicles
- 79E-Detonations, Explosion Effects, & Ballistics
- 79F-Fire Control & Bombing Systems
- 79G-Guns
- 79H-Rockets
- 79I-Underwater Ordnance

## 82-PHOTOGRAPHY & RECORDING DEVICES

- 820-General
- 82A-Holography
- 82B-Photographic Techniques & Equipment
- 82C-Recording Devices

## 46-PHYSICS

**460-General**

**46A-Acoustics**

**46B-Fluid Mechanics**

**46C-Optics & Lasers**

**46D-Solid State Physics**

**46E-Structural Mechanics**

**46G-Plasma Physics**

**46H-Radiofrequency Waves**

## 43-PROBLEM-SOLVING INFORMATION FOR STATE & LOCAL GOVERNMENTS

**430-General**

**43A-Finance**

**43B-Economic & Community Development**

**43C-Human Resources**

**43D-Police, Fire, & Emergency Services**

**43E-Energy**

**43F-Environment**

**43G-Transportation**

## 84-SPACE TECHNOLOGY

**840-General**

**84A-Astronautics**

**84B-Extraterrestial Exploration**

**84C-Manned Spacecraft**

**84D-Spacecraft Trajectories & Flight Mechanics**

**84E-Space Launch Vehicles & Support Equipment**

**84F-Space Safety**

**84G-Unmanned Spacecraft**

## 85-TRANSPORTATION

**850-General**

**85A-Air Transportation**

**85C-Metropolitan Rail Transportation**

**85D-Transportation Safety**

**85E-Pipeline Transportation**

**85F-Global Navigation Systems**

**85G-Marine & Waterway Transportation**

**85H-Road Transportation**

**85I-Railroad Transportation**

## 91-URBAN & REGIONAL TECHNOLOGY & DEVELOPMENT

**910-General**

**91A-Environmental Management & Planning**

**91B-Transportation & Traffic Planning**

**91C-Fire Services, Law Enforcement, & Criminal Justice**

**91D-Communications**

**91E-Housing**

**91F-Health Services**

**91G-Urban Administration & Planning**

**91H-Regional Administration & Planning**

**91I-Emergency Services & Planning**

**91J-Economic Studies**

**91K-Social Services**

**91L-Recreation**

# NTIS SUBJECT CATEGORIES - ALPHABETICAL LISTING BY ALL CATEGORIES

## APPENDIX C

# NTIS SUBJECT CATEGORIES - NUMERICAL LISTING OF MAJOR CATEGORIES

## APPENDIX D

Primary category titles arranged by subject category code. This list will assist you in using the cross reference category codes provided in many of the descriptions.

**41 Manufacturing Technology**
**43 Problem Solving Information for State & Local Governments**
**44 Health Care**
**45 Communications**
**46 Physics**
**47 Ocean Sciences & Technology**
**48 Natural Resources & Earth Sciences**
**49 Electrotechnology**
**50 Civil Engineering**
**51 Aeronautics & Aerodynamics**
**54 Astronomy & Astrophysics**
**55 Atmospheric Sciences**
**57 Medicine & Biology**
**62 Computers, Control & Information Theory**
**63 Detection & Countermeasures**
**68 Environmental Pollution & Control**
**70 Administration & Management**
**71 Materials Sciences**
**72 Mathematical Sciences**
**74 Military Sciences**
**75 Missile Technology**
**76 Navigation, Guidance &Control**
**77 Nuclear Science & Technology**
**79 Ordnance**
**81 Combustion, Engines, & Propellants**
**82 Photography & Recording Devices**
**84 Space Technology**
**85 Transportation**
**88 Library & Information Sciences**
**89 Building Industry Technology**
**90 Government Inventions for Licensing**
**91 Urban & Regional Technology & Development**
**92 Behavior & Society**
**94 Industrial & Mechanical Engineering**
**95 Biomedical Technology & Human Factors Engineering**
**96 Business & Economics**
**97 Energy**
**98 Agriculture & Food**
**99 Chemistry**

# NTIS SUBJECT CATEGORIES - NUMERICAL LISTING WITH SCOPE DESCRIPTIONS

## APPENDIX E

## 41-MANUFACTURING TECHNOLOGY

**410-General***

Includes mechanical elements; Pipes; Tubes; Levers; Cams; Springs; Clutches; Gears; Valves; Filters; Containers and packing materials; Refrigeration systems and equipment; Industrial furnaces and boilers; Heat exchangers; Heat pumps; Heat pipes; Energy management, economics, and financing; International issues.

See also 94O and 97G.

For engine components, use 81.

For fuel tanks, use 81C.

For cooling towers, use 97J.

**41A-Computer Aided Design (CAD)**

Application of computer hardware and software (programs) to enhance the design, computations, simulation, analysis and modeling, presentations, graphics, drafting, data base creation and human-machine interface, associated with the creation of engineering design specifications.

See also 94A.

* Every primary subject category has a "General" subcategory which contains items whose subject matter falls either into several subcategories or none of the subcategories within a primary category.

In the generic example that follows, the Primary Subject Category is Administration & Management; the Subject Category Code is 70; the Subcategory and Code is 70A; and the descriptions follow. The descriptions are the concepts contained in a report; be careful to avoid "word matching."

## 70-ADMINISTRATION & MANAGEMENT

**70A-Inventory control**

Inventory analysis; Inventory models; Obsolescence; Repair-replacement tradeoffs; Spare parts; Stock level control; Usage prediction; Warehouse automation; Stock-piling.

**41B-Computer Aided Manufacturing (CAM)**

Application of computer hardware and software (programs) to enhance materials planning, processing and handling, tooling; Assembly; Quality and reliability control; Inspection; Tests; Scheduling and control; Facilities and equipment maintenance; Group technology applications; Inventory control (raw material, in process and finished); Numerical controls and automation; The creation of Direct Numerical Control (DNC) and Computer Numerical Control (CNC) manufacturing cells and systems.

See also 94A and 94G.

**41C-Robotics/Robots**

Application of computer hardware and software, controls, sensors, electromechanical and hydro-mechanical devices, to the creation of robots and the application of robots to all facets of manufacturing. Study of biological processes in order to develop engineering systems; Pattern recognition systems based on biological models. Includes feature extraction; Image enhancement; Image restoration; Scene analysis; Character recognition.

See also 95F and 62F.

**41D-Productivity**

Productivity of employees, management, and services; Improving quality of worklife; Measurement of productivity efficiency and effectiveness; Employee attitudes and motivation; Manpower utilization and performance improvement, job satisfaction, job security; Labor-management, job redesign; Alternative work schedules; Incentive plans; Productivity barriers including regulation, obsolete practices; Paperwork, and financing methods.

See also 70G and 70D.

**41E-Manufacturing, Planning, Processing & Control**

Fabrication, assembling, cleaning, and finishing; Industrial and manufacturing processes (limited to in-depth studies that directly discuss specific processes); Materials forming and machining; Heat treatment; Fabrication and manufacturing; Layout; Coating processes; Materials handling and control, including palletizing, conveying, warehousing, storing, containerization, and packaging; Time and motion studies; Scheduling; Production controls and programming; Modeling techniques and program controls; Inventory management.

See also 94A.

For the beneficiation and processing of minerals, use 48A.

For chemical engineering and processing, use 99B.

For computer-aided manufacturing, use 41B and 94G.

For lasers used in manufacturing, use 41M.

For processing and packaging of food, use 98H.

For production of materials, use 71.

**41F-Joining**

Bonding and joining including gluing, welding, soldering, brazing, and fastening; Joints and fasteners; Physical, mechanical, and structural properties of adhesives, sealants, glue, binders, seals, and gaskets.

See also 94G, 94Gen, and 71B.

**41G-Quality Control & Reliability**

Tolerance allocation; Maintainability requirements; Probability of satisfactory performance of components and equipment; Inspection methods; Reliability theory; Quality assurance; Nondestructive testing having industrial application; Ultrasonic, radiographic, hydrostatic, magnetic, and optical nondestructive techniques and equipment; Nondestructive testing of flaws, thickness, opacity, strength; Destructive industrial testing; Metrology.

See also 94B, 94J, and 94Gen.

**41H-Plant Design & Maintenance**

Site selection; Plant design; Maintenance Management; Scheduled, routine, and corrective maintenance; Security.

See also 94C.

**41I-Job Environment**

Industrial hygiene and occupational safety and health. See also 57U, 68G, and 44G. Workplace layout and design; Human factors engineering; Includes Industrial psychology and Industrial sociology; Worker interactions.

See also 94D and 95D.

Includes environmental engineering equipment related to industrial use. See also 97J, 89B, and 94E.

For mine safety, use 48A.

For ordnance safety, use 79A.

For nuclear radiation safety, use 77.

For transportation safety, use 85D.

**41J-Tooling, Machinery, & Tools**

Machine subassemblies; Tools; Machinery including hoists, conveyors, and pumps; Design, production performance, and testing of hydraulic and pneumatic systems, accumulators, actuators, compressors and distribution equipment; Fluidic and flueric devices; Ergonomics interaction of man and equipment in terms of subsystem and system performance requirements and evaluation; Man-machine systems and human factors engineering.

See also 94F, 94I, 94D, and 95D.

For hydraulic fluids, use 71K.

**41K-Engineering Materials**

Performance; Properties, fabrication and manufacturing methods of ceramics, coatings and composite materials including ceramic coatings, ceramic fibers, corrosion resistant coatings, reinforced plastics, graphite or carbon composites, laminates; Metal matrix composites, and fiber and particulate composites.

See also 71B, 71D, and 71F.

**41L-Tribology**

Friction, lubrication and wear, including bearings; Unwanted chemical reaction effects on metals, corrosion of metals and corrosion resistant coatings; Lubricants.

See also 71L, 71G, and 71K.

**41M-Optics & Lasers**

Design and performance of optical equipment for use in manufacturing applications. Includes laser applications such as laser annealing, cutting, drilling, and welding.

See also 46C.

**41N-Computer Software**

Computer programming; Programming languages; Compilers; Data base management systems; CAD/CAM robotics.

See also 62B.

**41O-Domestic Commerce, Marketing, & Economics**

Economic impacts on industries; Productivity; Wage surveys; Domestic market surveys.

See also 96A.

**41P-Research Program Administration & Technology Transfer**

Research needs; Technology transfer and forecasting.

See also 70E.

## 43-PROBLEM-SOLVING INFORMATION FOR STATE & LOCAL GOVERNMENTS

**430-General**

Includes internal government administration; State programs; Criminal justice, corrections planning, and administration.

**43A-Finance**

Taxation; Revenue; Budgeting; Revenue sharing; Financing; Allocation.

See also 91G and 91H.

For commercial banking and finance operations, use 96F.

**43B-Economic & Community Development**

Land use planning; Urban renewal; Economic effects; Economic planning and development; Recreation planning and development; Economic readjustment.

See also 91J and 96A.

**43C-Human Resources**
Education; Social services; Health care services; Manpower.

See also 9lK and 92C.

**43D-Police, Fire, & Emergency Services**
Police and fire services and administration; Disaster services; Civil defense; Emergency weather services, Pollution alerts; Civil disturbances; Ambulance services; Disaster relief.

See also 91C and 91I.

**43E-Energy**
Management and planning on energy resources, use and production; Government administration and forecasting.

See also 97.

**43F-Environment**
Air, water, noise, waste management and planning; Monitoring services.

See also 68.

**43G-Transportation**
Planning for modes of public, private, and cargo transportation; Highway planning, Parking; Traffic engineering.

See also 85 and 91B.

## 44-HEALTH CARE

**440-General**

**44A-Planning Methodology**
Health planning theory including methods, tactics, techniques and policies; Evaluation of planning theories and processes.

**44B-Agency Administrative & Financial Management**
Management practices and policies regarding technical assistance, evaluation of health care agency activities, public relations; Financial management and accounting methods.

**44C-Community & Population Characteristics**
Data and numerical information including health status, quality of care, malpractice, health care needs / demands; Health care utilization, health care cost, vital statistics; Demographic information, economic, environmental, nutritional, and societal factors affecting health, and health resource distribution.

**44D-Health Care Assessment & Quality Assurance**
Financial feasibility review, economic impact review, and project review; Certificate of need theory; Health manpower education institutional accreditation; Judicatory procedures, review, and assessment; Quality assurance theory; Certificatory methodology; Health manpower proficiency testing, and public health education evaluation; Classification of health care facilities and health care personnel.

**44E-Health Care Measurement Methodology**
Measurement of health status, quality of care, health facility supply, health manpower supply, proficiency and productivity, and health care costs; Health care needs / demands and utilization measurement.

See also 44L, 44N, and 44Q.

**44F-Health Care Forecasting Methodology**
Projecting health care needs / demands and health care utilization; Health care facility supply; Health manpower supply; Health care costs; Home health care; Cross-impact projections.

**44G-Environmental & Occupational Factors**
Environmental factors affecting health including housing, sanitation, water pollution, solid waste pollution, noise pollution, disease vectors, safety hazards, and occupational and industrial hazards; Overpopulation; Health facility environmental considerations and environmental impact; Energy sources in the health field.

See also 57U and 68G.

**44H-Health Care Technology**
Descriptions and applications of new health care technology and equipment; Ailment prevention techniques, and technology regarding diagnosis, therapy, rehabilitation, and food and nutrition; Health care equipment and facility design and performance considerations.

See also 57 and 95.

**44J-Health Delivery Plans, Projects & Studies**
Plans, projects, and studies related to the institutional delivery of health services including state / local health plans, state / local medical facility plans, plans for specific health services, and health delivery feasibility studies.

**44K-Health Services**
Personal and public health services, patient care, and maintenance of an individual's health status including hospital services acute in-patient services, long-term inpatient services, nursing home services, emergency services, public health services, mental services, nursing services, dental services, and medically-related social services including institution discharge services.

**44L-Health Care Needs & Demands**
Measurement of health care needs / demands, hospital care, acute in-patient care, long-term in patient care, nursing home care, medical care, mental care, nursing care, dental care, and health insurance; Home health care; Measurements of health manpower requirements / demands.

See also 44E.

**44M-Health Resources**
Surveys, reports, and studies related to specific health care resources including manpower, facilities, sources of financing, and government and private health-related organizations, agencies and individuals.

**44N-Health Care Utilization**
Measurements regarding utilization of health resources including manpower, ambulatory care, emergency care, public health care, medical care, mental care, nursing care, dental care, health insurance, health care facilities, and home health care.

See also 44E and 44L.

**44P-Health Education & Manpower Training**
Health manpower education including curricula and costs; Health manpower education facility needs/demands; Institutional financing; Financing for health related educational institutions; Student recruiting and retention methods; Continuing education; Career guidance and career advancement; Consumer health education and public health education methods.

**44Q-Health-Related Costs**
Health care costs, indexes, projections, in-patient care costs, acute in-patient care costs, long-term care costs, nursing home care costs, ambulatory care costs, emergency care costs, public health care costs, medical care costs; Insurance costs; Manpower income; Equipment costs; Facility utilization and construction costs; Ailment costs including preventive medicine costs and injury costs; Transportation costs including emergency transportation costs.

**44R-Economics & Sociology**
Discussions of economic and sociological factors and theories relevant to health care.

**44S-Legislation & Regulations**
Laws, bills, regulations, and model legislation. Includes certificate of need, health insurance certification, health manpower licensing, health facility licensing, health manpower employment, and support regarding health manpower education.

**44T-Data & Information Systems**
Techniques regarding information systems including document sources, acquisition, surrogation, and storage; Information retrieval; Data systems, Data gathering; Data processing; Data processing hardware; Information system feasibility studies, and confidentiality of information.

**44U-Health Care Delivery Organization & Administration**
Hospital and medical practice administration and management; Organizational structure of health services; Management policies and practices regarding personnel, community participation and relations, and coordination with other agencies; Financial management and accounting methods; Financing of health delivery and facilities; Reporting methods and requirements.

# 45-COMMUNICATION

**450-General**

**45A-Policies, Regulations, & Studies**
Licensing; Legislation; National policies and Federal regulatory controls; Frequency management; Broadcasting standards; Time signals, etc.

**45B-Radio & Television Equipment**
Design and maintenance of radio and television transmitting and receiving equipment only.

See also 51E.

**45C-Common Carrier & Satellite**
All communication equipment except radio and television. Optical, radio, microwave, wire, and acoustic communication; Telephone, telemeter, telegraph, television, and radio communication systems; Computer network communications; Digital communication; Intercommunication systems; Optical scanning.

For information systems, see also 88B.

For design and construction of communication satellites, see also 84G.

**45D-Sociopolitical**
Propaganda; Social communication; Sign language, Effects of communication on society and behavior; Postal service; Mass media communication.

**45E-Graphics**
Publishing; Printing; Graphic arts; Reprography; Xerography; Facsimile; Desk top publishing.

**45F-Verbal**
Research and development in vocal communication; Speech intelligibility; Speech recognition.

**45G-Communication & Information Theory**
Theoretical studies relating to the measurement and transmission of information in a communication channel. Includes coding theory, information capacity, detection of signals in noise.

See also 62E.

# 46-PHYSICS

**460-General**
Includes electron and X-ray optics; Thermodynamics; Nuclear physics; elementary particles; Atomic and molecular physics.

**46A-Acoustics**
Generation and transmission of sound through various media or enclosures. Includes ultrasonic and infrasonic radiation.

See also 63A.

**46B-Fluid Mechanics**
Theoretical and experimental studies of the dynamics and statics of fluids and of relative motion between fluids and solid bodies; Aerodynamics and hydrodynamics; Water tunnel studies and equipment.

For wind tunnel equipment and facilities, use 51F.

For operational applications, use 51A, 75E, and 84D.

For plasma physics, use 46G.

**46C-Optics & Lasers**
Generation and propagation of electromagnetic waves in the infrared, visible, and ultraviolet region of the spectrum; Theory; Design and performance of optical equipment; Lasers and masers.

**46D-Solid State Physics**
Physical properties of solids as related to their structure. Fundamental research and theoretical studies on semiconductors, superconductors, structure of solids. Includes crystallography and superconductivity.

For semiconductor devices, use 49H.

For structural mechanics, use 46E.

For studies on ceramics, coatings, composite materials, metals, and alloys, use 71.

**46E-Structural Mechanics**
Dynamics and statics of solid bodies; Kinematics; Shock and vibration.

**46G-Plasma Physics**
Properties and actions of plasmas, including magnetohydrodynamics, pinch effect, plasma oscillations, plasma jets; Plasma diagnostics; Plasma dynamics. Plasmas in thermonuclear devices.

See also 77A.

For MHD generators, use 97O.

For astrophysics, use 54C.

For aeronomy, use 55A.

**46H-Radiofrequency Waves**
Generation and propagation of radiofrequency waves.

For communication systems, techniques, equipment, etc., use 45.

For radiofrequency detection, use 63H.

## 47-OCEAN SCIENCES & TECHNOLOGY

**470-General**
Includes breakwaters; Onshore and offshore facilities; Ocean dredging operations; Beach erosion; Harbor engineering; Ocean mining; Anchors; Buoys; Seakeeping; Diving operations and equipment; Decompression equipment.

See also 50B, 47H, and 95E.

**47A-Marine Engineering**
Design, construction, and maintenance of ships, boats, and related equipment; Salvage operations; Naval architecture; Shipyards and shipbuilding; Submarines; Shipborne containerization.

See also 85G.

**47B-Dynamic Oceanography**
Ocean waves; Sea level changes; Ocean currents; Ocean tides; Littoral transport; Sea ice movement.

**47C-Physical & Chemical Oceanography**
Physical and chemical properties of sea water, the ocean bottom, and estuaries; Sea ice.

For glaciers and fresh water ice, use 48H.

**47D-Biological Oceanography**
Plant and animal life in the marine environment; Biological fouling; Marine ecology; Biological aspects of mariculture; Use of marine organisms as bioassay systems; Marine aspects of estuaries; Marine biology of anadromous fishes.

See also 57C, 57H, 57K, 57F, 57Z, and 98F.

**47E-Marine Geophysics & Geology**
Geophysical and geological studies and surveys as applied to a marine environment; Plate tectonics; Sea floor spreading; Continental drift.

See also 48F.

**47F-Oceanographic Vessels, Instruments, & Platforms**
Instrumentation and equipment to collect and process oceanographic data; Remote sensors.

**47G-Hydrography**
Hydrographic surveying; Ocean bottom topography; Bathymetry.

**47H-Underwater Construction & Habitats**
Closed environments; Underwater work and construction; Underwater construction equipment.

See also 47Gen or 95E.

## 48-NATURAL RESOURCES & EARTH SCIENCES

**480-General**

**48A-Mineral Industries**
Industries and their processes that exploit metallic and nonmetallic, fuel and nonfuel resources. Includes coal mining, mining wastes, and acid mine drainage; Coal preparation; Petroleum exploration, drilling, and production; Metals exploration and mining; Exploration geophysics and seismology; Reserves; Mine safety; Mineral economics; Underwater and continental shelf mining; Natural resources studies (excluding Earth Resource Satellite Surveys). If energy source production related, use 97.

For petroleum refining, use 97K and 99B.

**48B-Natural Resource Management**
Conservation and management of natural resources, including land and soil, water, forest, grassland, and other vegetation; Fish and wildlife management; Mineral management; Policies and legislation including game laws and licensing; Water resource management; Water supply; Deforestation; Forest fire prevention.

See also 98F, 48A, 48C, and 48D.

**48C-Natural Resource Surveys**
Use of scientific satellites, aerial photography, and other remote sensing techniques to scan the earth's surface in data gathering experiments on soils, mineral resources, hydrology, animals, forests, and other resources; Surveying techniques such as image processing, photointerpretation, and pattern recognition.

For agricultural resource surveys, use 98G; For equipment studies, use 63.

**48D-Forestry**
Forest description and measurement; Forest influences; Forest protection and management; Harvesting, logging, sawmills, and transportation; Silviculture; Forest nurseries; Afforestation reforestation, and deforestation; Forest fires and prevention.

For wood utilization, use 71R.

**48E-Soil Sciences**
Soil biology, chemistry, moisture, mineralogy, classification, surveys; Soil erosion and its prevention; Land reclamation, terracing, contouring, polders, tillage, and fertility; Soil banks.

For irrigation, use 98C.

For mechanical and engineering properties, use 50D.

**48F-Geology & Geophysics**
Structure, properties, and classification of rocks; Paleontology; Stratigraphy; Geodesy; Structural geology; Engineering geology; Vulcanology; Petrology; Petrography; Tectonics.

For astrogeology, use 54A.

For geological studies relating to energy or mineral reserves, use 97A and 48A respectively.

For marine geology and geophysics, use 47E.

**48G-Hydrology & Limnology**
Properties, distribution, and circulation of fresh water, including its surface and underground occurrence; Physical and chemical conditions in fresh water bodies; Eutrophication; Chemical-biological interrelationships; Water runoff; Water losses; Ground water; Streams; Aquifers.

For studies of estuaries or sea water, use 47.

**48H-Snow, Ice, & Permafrost**
Physical characteristics including trafficability, stability, and mechanical properties; Glaciology.

For sea ice, use 47C, and for sea ice movement, use 47B.

**48I-Cartography**
Map making; Photogrammetry; Terrain models; Topography. Geographic information systems; Cartography; Actual physical processes, procedures, and methods of map making.

## 49-ELECTROTECHNOLOGY

**490-General**
Includes standards, measurements, and instrumentation not applied to any other subcategories.

**49A-Antennas**
Antennas; Antenna theory; Antenna radiation patterns; Radomes.

**49B-Circuits**
Circuit theory; Network analysis; Filters; Oscillators; Logic circuits; Printed circuits; Electronic modules; Commutators; Power supply circuits; Waveform generators; Analog to digital converters; Phase locked systems.

For integrated circuits, use 49H.

**49C-Electromechanical Devices**
Electric motors; Relays; Mechanical switches; Connectors; Circuit breakers; Electric fuses.

**49D-Electron Tubes**
All electron tubes except those in 49E.

**49E-Optoelectronic Devices & Systems**
Display systems; Phototubes; Image tubes; Cathode ray tubes; Electroluminescent panels; Light emitting diodes; Photodiodes; Phototransistors; Magnetooptics; Electrooptics; Optical detectors, including infrared and ultraviolet detectors.

See also 63C and 63F.

For solar cells, see also 97N.

For lasers, use 46C.

**49F-Power & Signal Transmission Devices**
Transmission lines; Electric wire and cable; Waveguides; Fiber optics transmission lines.

**49G-Resistive, Capacitive, & Inductive Components**
Resistors; Capacitors; Inductors; Transformers; Electromagnets; Potentiometers; Thermistors; Delay lines; Transducers; Crystal resonators. Includes miscellaneous and basic components.

**49H-Semiconductor Devices**
Transistors; Semiconductor diodes; Integrated circuits.

For photodiodes, phototransistors, light emitting diodes, and optical detectors, use 49E.

## 50-CIVIL ENGINEERING

**500-General**

**50A-Highway Engineering**
Construction of roads and highways; Highway and rights-of-way maintenance including weed control; Bridges and bridge systems; Highway paints and markings; Highway and road signs; Beautification; Slope stability and soil subbases.

**50B-Civil Engineering**
Dredging; Dams; Water purification; Reservoir engineering; Flood control; Sewers; Waterway engineering; Runway construction; Shore protection; Breakwaters; Harbor engineering; Tunneling.

See also 47.

For sewage treatment, use 68D.

For building construction, use 89.

For oil and gas reservoir engineering, use 97 or 48A.

**50C-Construction Equipment, Materials, & Supplies**
Excavation and earth moving equipment; Hoisting and conveying equipment; Concrete and cement.

See also 89G.

For properties of concrete and cement, see also 71D.

**50D-Soil & Rock Mechanics**
Physical properties of soil and rock for utilization in engineering; Landslides; Soil stabilization.

For soil sciences, use 48E.

For soil conservation, use 48B.

For geology and geophysics, use 48F.

## 51-AERONAUTICS & AERODYNAMICS

**510-General**
Includes landing mats.

**51A-Aerodynamics**
Aerodynamic characteristics and problems of bodies as they are affected by the dynamics of phenomena relating to boundary layer, lift, drag, laminar and turbulent flow, compressible flow, lift, aerodynamic heating, vortex flow, wake, etc. in aerodynamic regimes. Includes aircraft, ground vehicles, and structures.

See also 46B.

For missile reentry dynamics, use 75E.

For spacecraft reentry dynamics, use 84D.

**51B-Aeronautics**
Aircraft operations such as takeoff and landing, all weather and night flight, taxiing, approach, letdown, in-flight refueling, etc. Includes aviation accidents.

**51C-Aircraft**
Design, production, and maintenance of aircraft, aircraft components and equipment. Structural studies of airframes, bodies, wings, fuselages; Military and commercial aircraft; Balloons (excludes meteorological balloons); Air cushion vehicles (excludes tracked vehicles).

See also 85A and 81D.

For meteorological balloons, use 55D.

For tracked air cushion vehicles, use 85C.

For electronic equipment, use 51E.

**51D-Parachutes & Decelerators**
Deployable devices and structures to induce drag and deceleration of aircraft, spacecraft, and test vehicles such as rocket sleds.

**51E-Avionics**
Airborne electronic equipment. Includes electronic equipment used for communications; Navigation; Control systems; Onboard air traffic control; Detection.

See also 45, 49, 63, and 76.

**51F-Test Facilities & Equipment**
Wind tunnels; Simulators; Flight simulators.

For flight simulators used for training, use 92A.

## 54-ASTRONOMY & ASTROPHYSICS

**540-General**

**54A-Astrogeology**
Studies of the structure and composition of planets and other bodies in the solar system.

For geology and geophysics, see also 48F.

**54B-Astronomy & Celestial Mechanics**
Positions and motions of the celestial bodies; Ephemerides, Eclipses.

**54C-Astrophysics**
Physical and chemical aspects of celestial bodies, their origin and evolution. Includes astronomical spectroscopy, radio astronomy, solar structure, and planetary atmospheres.

**54D-Cosmic Ray Research**
Detection and analysis of cosmic rays.

## 55-ATMOSPHERIC SCIENCES

**550-General**

**55A-Aeronomy**
Physics and chemistry of the upper atmosphere; Composition; Chemical reactions; Aurora; Airglow; Solar-terrestrial relationships.

For cosmic ray research, use 54D.

**55B-Dynamic Meteorology**
Studies of atmospheric motions; Atmospheric diffusion models; Atmospheric circulation.

For air pollution movement studies, use 68A.

**55C-Meteorological Data Collection, Analysis, & Weather Forecasting**
Climatology; Satellite meteorology; Weather prediction; Ice forecasting.

**55D-Meteorological Instruments & Instrument Platforms**
Instruments used to record meteorological parameters; Meteorological balloons; Weather stations; Sounding rockets; Remote sensors.

**55E-Physical Meteorology**
Acoustical, electrical, optical, and thermodynamic properties of the atmosphere; Cloud physics; Precipitation theory; Global warming.

See also 68A.

**55F-Weather Modification**
Change of weather conditions through artificial means; Fog dispersal; Artificial precipitation.

# 57-MEDICINE & BIOLOGY

**570-General**

**57A-Anatomy**
Descriptive and comparative anatomy of humans; Anthropometry; Dissection; Neuroanatomy; Morphology.

For plant anatomy, use 57C.

For animal anatomy, use 57Z.

**57B-Biochemistry**
Studies of the chemical processes which take place in biological systems. Identification and measurement of biochemical substances and methods of analysis, including assaying.

See also 57F, 57L, 57Q, and 99A.

For measurement of biochemical substances for clinical diagnoses, use 57D.

**57C-Botany**
Study of macroscopic and microscopic plants; Plant anatomy, physiology, pathology, and taxonomy; Phytotoxicity; Includes algae and diatoms.

See also 57H, 57K, 57Y, and 98D.

**57D-Clinical Chemistry**
Techniques and instrumentation for chemical analysis of body fluids, including blood, and tissues for clinical diagnoses.

See also 99A.

**57E-Clinical Medicine**
Prevention, diagnosis, and therapy of diseases; Nuclear medicine; Experimental medicine; Clinical protocols.

See also 57J, 57O, and 57X.

For veterinary medicine, use 98E.

For health care services, use 44.

For epidemiology and disease control, use 57U.

**57F-Cytology, Genetics, & Molecular Biology**
Origin, structure, and functions of living cells and cell components; Hereditary diseases; Use of chemistry and physics to study biological phenomena on the molecular level; Structure and function of biological macromolecules, e.g. proteins and nucleic acids.

See also 57B.

**57G-Dentistry**
Prevention, diagnosis, and treatment of diseases of the teeth, oral cavity, and associated parts; Oral hygiene.

For dental materials and equipment, use 95C.

For dental prosthetics, use 95A.

For dental services, use 44.

**57H-Ecology**
Interrelationships of organisms and their environment; Animal, plant, and human ecology; Marine, fresh water, and terrestrial ecology; Ecosystems; Adaptation; Acclimatization; Natural selection; Species diversity; Food chains; Energy balance; Ecological succession; Effects of polluted environments on organisms; Biological productivity.

See also 47D, 48B, 48G, 57C, 57Y, 57Z, 68, 98D, and 98B.

For effects of extreme environments or stimuli on humans, use 57W.

For the interrelationships of humans and their social environments, use 92.

For the effects of industrial environments on humans, use 57U.

**57I-Electrophysiology**
Electrical activity associated with living organisms and life processes; Electrophysiologic recording including electrocardiography, electroencephalography, and electromyography; Neural transmission; Intracellular potential; Bioelectricity; Bioluminescence; Responses of organisms to electrical stimulation.

**57J-Immunology**
Mechanisms of immune responses; Antigens and antibodies; Vaccines; Immune serums; Immunization; Immunopathology; Immunohematology; Immunochemistry; Serology; Immunity; Allergy; Histocompatibility; Autoimmune diseases. HIV / AIDS.

See also 57E and 57K.

**57K-Microbiology**
Studies of microscopic plants and animals; Vaccine and interferon production; Microbial metabolism and biochemistry.

For diagnosis and therapy of infectious diseases, use 57E.

For disease control and epidemiology, use 57U.

For biotechnology applications, see also field of application.

**57L-Nutrition**
Processes by which humans assimilate and utilize food substances; Experimental nutrition; Nutritive value of foods; Malnutrition; Diet; Food habits; Nutrition surveys; Nutritional requirements; Clinical nutrition.

For food processing, use 98H.

For animal nutrition related to animal husbandry, veterinary medicine or zoology, use 98E or 57Z.

**57M-Occupational Therapy, Physical Therapy, & Rehabilitation**
Restoration of normal form and function after injury or physical illness; Occupational therapy; Physical therapy; Vocational rehabilitation.

See also 44K, 92A, 95A.

For mental rehabilitation, use 57T.

For social rehabilitation, use 92C and 91K.

For rehabilitation centers, use 44K.

**57N-Parasitology**
Parasites and parasitism; Host-parasite interactions; Vectors of parasites; Parasitic diseases; Life cycles of parasites.

See also 57H, 57K, and 57P.

**57O-Pathology**
Studies of the structural and functional changes in tissues and organs which cause or are caused by diseases, trauma or injuries; Gross pathology; Histopathology; Cytopathology; Pathophysiology; Ccmparative and experimental pathology; Histological techniques; Autopsy.

For plant diseases, use 98D.

For animal diseases, use 98E.

For diagnosis and treatment of diseases, use 57E.

For immunopathology, use 57J.

**57P-Pest Control**
Agents and methods for the control of plant and animal pests; Pesticides, algicides, herbicides, insecticides, molluscacides, fungicides, rodenticides, etc.; Repellants and attractants; Fumigation and extermination; Traps; Biological pest control.

See also 68E and 98C.

For ecological aspects of pest control, use 57H.

**57Q-Pharmacology & Pharmacological Chemistry**
Synthesis, composition, properties, and effects of drugs; Pharmacy, Pharmacodynamics.

See also 57Y.

For social effects of drugs, use 91C and 92C.

For radiopharmaceuticals, use 57V.

For business studies of the drug industry, use 96A.

**57S-Physiology**
Functions of the human organism and its parts and comparative physiology; Metabolism; Endocrinology; Neurophysiology; Respiration; Biological rhythms; Growth; Aging; Regeneration.

See also 57B, 57F, 57J, and 57L.

For plant physiology, use 57C.

For animal physiology, use 57Z and 98E.

For psychophysiology, use 57T and 92B.

For electrophysiology, use 57I.

For pathophysiology, use 57O.

For stress physiology, use 57W.

**57T-Psychiatry**
Prevention, diagnosis, and treatment of mental, emotional, and behavioral disorders; Psychopathology; Psychoanalysis; Neuropsychiatry; Orthopsychiatry; Psychotherapy; Psychophysiology; Psychophysics.

For psychological mechanisms and processes, use 92B.

**57U-Public Health & Industrial Medicine**
Protection and improvement of community health; Effects of environments on public health; School and public health programs, services, and education; Health screening; Health statistics; Epidemiology; Toxic and infectious disease control; Preventive medicine; Hygiene and sanitation; Drinking water quality; Industrial hygiene and medicine; Safety engineering; Occupational safety and health; Industrial safety and detection equipment; Site-specific investigations.

See also 94D, 94H, 41I and 68G.

For occupational and For occupational and environmental factors related to health planning, use 44G.

**57V-Radiobiology**
Biological effects of radiation; Dosimetry; Health physics; Radiation sickness and injury; Radiation hazards; Radiation protection; Radiopharmaceuticals. Includes electromagnetic, ultrasonic, and particle radiation.

See also 68F and 99E.

For radioecology, use 57H.

For nuclear medicine, radiology, and radiotherapy, use 57E.

**57W-Stress Physiology**
Effects of extreme environments or stimuli on human biological processes; Physiological effects of motion, gravity, sound, temperature, electromagnetic, fields, pressure, sensory deprivation, and fatigue; Acclimatization. Includes aerospace and underwater medicine.

See also 51B, 57H, and 84.

For plants, use 57C.

For animals, use 57Z.

For stress psychology, use 92B or 57T.

**57X-Surgery**
Treatment of diseases, injuries, and deformities by manual or operative methods; Organ and tissue transplantation; Pre-and post-management of surgical patients; Experimental surgery.

See also 95A and 95B.

For dental surgery, use 57G.

For histocompatibility, use 57J.

**57Y-Toxicology**
Study of the adverse effects of substances on biological systems and the diagnosis and treatment of toxic diseases; Toxicity studies; Risk assessment of chemicals; Antidotes.

See also 57C, 57Q, 57S and 57Z.

**57Z-Zoology**
Animal anatomy and physiology; Natural history; Animal behavior; Taxonomy.

See also 47D, 48B, 57Y, and 98F.

For animal models used in biomedical research, use the research discipline.

For laboratory and domesticated animal care, or animal diseases, use 98E.

# 62-COMPUTERS, CONTROL & INFORMATION THEORY

**620-General**
Includes computer security; Artificial intelligence; Signal processing (unapplied).

**62A-Computer Hardware**
Design and development of computers and peripheral equipment, including analog computers, digital computers, hybrid computers, special purpose computers, minicomputers, microcomputers; Computer accessories, supplies and installation; Logic circuits; Computer architecture; Computer network hardware.

For computer hardware applied to a specific application, see the field of application.

For Very Large Scale Integration (VLSI), use 49H.

**62B-Computer Software**
Computer programming; Programming languages; Compilers; Data base management systems; Software tools; Software reliability; Computer graphics.

For computer software and database development applied to a specific application, see the field of application.

For CAD/CAM, use 41A and 41B.

**62C-Control Systems & Control Theory**
Theoretical studies of open-loop and closed-loop control systems; Automatic control systems; Principles including adaptive, continuous, digital, distributed parameter, linear, multivariable, nonlinear, optional, predictive, and proportional; Process controllers.

See also 72Gen.

For control systems applied to a specific application, see the field of application.

**62D-Information Processing Standards**
Standards for the use of automatic data processing equipment and systems. Includes standards for hardware, software, applications, and data; Federal Information Processing Standards (FIPS).

**62E-Information Theory**
Theoretical studies relating to the measurement and transmission of information in a communication channel, including coding theory, information capacity, and detection of signals in noise.

See also 45G.

**62F-Pattern Recognition & Image Processing**
Includes feature extraction; Image enhancement; Image restoration; Scene analysis; Character recognition; Barcoding; Computer vision.

**62R-Applications Software**

**62S-Data Files**

# 63-DETECTION & COUNTERMEASURES

**630-General**
Automated access control systems.

For industrial security, see also 94Gen.

**63A-Acoustic Detection**
Techniques and equipment used for the detection and tracking of objects by means of sound waves, including ultrasonic and infrasonic radiation; Sonar.

For acoustic testing, use 94.

For detection techniques applied to chemistry, meteorology, astronomy, oceanography, medicine, and manufacturing, use 99, 55, 54, 47, 57, 41, and 94, respectively.

**63B-Electromagnetic & Acoustic Countermeasures**
Interception, jamming, antijamming, and deception of acoustic and electromagnetic signals; Techniques to nullify the use of detection, surveillance, guidance, and communication systems; Radar jamming; Chaff; Counter-countermeasures.

See also 74.

**63C-Infrared & Ultraviolet Detection**
Techniques and equipment for the detection and tracking of objects by infrared and ultraviolet radiation; Infrared night vision devices; Infrared homing.

See also 76B.

For earth resource surveys, use 48C and 98G.

For mapping, use 48I.

For photography, use 82B.

For nondestructive testing, use 94J.

For detection techniques applied to chemistry, meteorology, astronomy, oceanography, medicine, and manufacturing, use 99, 55, 57, 41, and 94, respectively.

**63D-Magnetic Detection**
Techniques and equipment for the detection of objects by means of magnetic fields.

For geomagnetism, use 48.

**63E-Nuclear Explosion Detection**
Techniques and equipment for the detection of nuclear explosions at high altitude, underground, and in space. Includes the use of shock waves, earth movement, and measurement of nuclear radiation levels.

See also other applicable subcategories in 63, especially 63I.

**63F-Optical Detection**

Techniques and equipment for the detection by means of light. Includes the use of binoculars, periscopes, telescopes, and night vision devices for object detection, and smoke particle detectors.

See also 46C.

For detection using only infrared or ultraviolet radiation, use 63C.

For earth resources surveys, use 48C and 98G.

For photography, use 82B.

For detection techniques applied to chemistry, meteorology, astronomy, oceanography, medicine, and manufacturing, use 99, 55, 54, 47, 41, and 94, respectively.

**63G-Personnel Detection**

Techniques and equipment for the detection of personnel. Includes the use of acoustic, seismic, olfactory, chemical, and optical detectors; Antiintrusion devices; Motion detectors; Security devices.

For military passive defense systems, see also 74I.

**63H-Radiofrequency Detection**

Techniques and equipment for the detection and tracking by means of radiofrequency waves; Radar; Microwave detection; See also 76.

For mapping, use 48I.

For detection techniques applied to meteorology, astronomy, oceanography, medicine, and manufacturing, use 55, 54, 57, 41, and 94 respectively.

**63I-Seismic Detection**

Techniques and equipment for the detection of objects by means of seismic waves.

For earthquake detection, use 48F.

For seismic prospecting, use 48A.

## 68-ENVIRONMENTAL POLLUTION & CONTROL

**680-General**

Any study covering multiple types of pollution. Includes broad pollution studies, such as life-cycle analysis of wastes.

**68A-Air Pollution & Control**

Air pollution from flue gases, exhaust gases, odors, dust, smog, microorganisms, etc.; Control techniques and equipment; Sampling and analytical techniques, and equipment; Waste gas recovery; Biological and ecological effects; Air pollution chemistry; Acid precipitation; Atmospheric motion; Laws, legislation, and regulations; Public administration; Economics; Land use.

See also 43F, 91A, 57, 85, 81, 99A, 99B, and 97R.

For effects on human health, use 68G.

For pesticides and radioactive contaminants, use 68E and 68F respectively.

**68B-Noise Pollution & Control**

Pollution in the environment by noise from any source including engine noise, traffic and transportation noise, machinery noise, industrial noise, urban noise, sonic boom; Theory and devices for control; Biological and ecological effects; Noise detection; Building technology; Laws, legislation, and regulations; Public administration; Land use.

See also 41I, 43F, 91A, 46A, 57, 85, 89, 94D, and 97R.

For effects on human health, use 68G.

**68C-Solid Wastes Pollution & Control**

Pollution by solid wastes including garbage, scrap, junked automobiles, spoil, sludge, containers; Disposal methods such as composts or land application, injection wells, incineration, sanitary landfills; Mining wastes; Processing for separation and materials recovery; Solid waste utilization; Recycling; Biological and ecological effects; Superfund (Records of Decision, etc.); SITE technology; Laws, legislation, and regulations; Public administration; Economics; Land use. Includes disposal of concentrated or pure liquids such as brines, oils, chemicals, and hazardous materials.

See also 43F, 91A, 57, 99B, and 97R.

For effects on human health, use 68G.

For the disposal of pesticides and radioactive contaminants, use 68E and 68F.

For the controlled disposal of radioactive wastes from nuclear reactors, use 77G.

**68D-Water Pollution & Control**

Pollution by municipal wastes, agricultural wastes, industrial wastes, mine wastes, radioactive contaminants; Chemistry and analysis of pollutants; Thermal pollution; Oil pollution; Control techniques and equipment; Sewage treatment; Industrial waste water pretreatment; Hydrology and limnology; Biological and ecological effects; Waste water reuse; Laws, legislation, and regulations; Public administration; Economics; Land use.

See also 43F, 91A, 47, 48G, 57, 97R, 98, 99A, and 99B.

For effects on human health, use 68G.

For pollution by pesticides and radioactive contaminants, use 68E and 68F respectively.

For the design and construction of sewers, and drinking water treatment, use 50B.

**68E-Pesticides Pollution & Control**

Pollution by insecticides, herbicides, fungicides, rodenticides; Residues; Decomposition studies; Analysis and detection; Soil chemistry and biology; Adverse biological effects; Ecology; Laws, legislation, and regulations; Public administration; Economics.

See also 57, 68A, 68C, 68D, 43F, 91A, 98, and 99A.

For effects on human health, use 68G.

**68F-Radiation Pollution & Control**
Involves pollution of the environment by particle and electromagnetic radiation from natural and synthetic sources, including neutrons, X-rays, ultraviolet radiation, microwaves, alpha particles; Radon; Sampling and analytical techniques; Fallout; Biological and ecological effects; Laws, legislation, and regulations; Public administration; Economics.

See also 57, 68A, 68C, 68D, 91A, 97R.

For effects on human health, use 68G.

For the controlled disposal of radioactive wastes from nuclear reactors, use 77G.

**68G-Environmental Health & Safety**
Effects of pollution on public health and safety; Toxicology; Industrial health; Physiology; Psychology; Clinical medicine; Radiobiology; Animals used as research experimental models.

See also 41I, 57, 44G, 68A, 68B, 68C, 68D, 91A, 43F, 94D, and 97R.

**68H-Environmental Impact Statements**
Only actual draft and final statements are posted in this subcategory. Environmental impact statements describing national effects are posted here and to other appropriate subcategories.

For studies about environmental impact statements, use 68Gen.

## 70-ADMINISTRATION & MANAGEMENT

**700-General**
Organizational structure and organization theory.

**70A-Inventory Control**
Inventory analysis; Inventory models; Obsolescense; Repair-replacement tradeoffs; Spare parts; Stock level control; Usage prediction; Warehouse automation; Stockpiling.

**70B-Management Practice**
Theory and concepts of management including record keeping, planning, scheduling, organization, coordination, decision making, policy making; Productivity management; Cost effectiveness; Systems management; Contact management; Management methods (PERT, PPB, etc.); Management games. Applied studies are classified in the application.

For research management, use 70E.

**70C-Management Information Systems**
Information systems which include data collection, data processing, and information delivery for use in decision making an evaluation by managers; Manual and automated systems.

See also 88B.

**70D-Personnel Management, Labor Relations & Manpower Studies**
Selection, recruitment, management, utilization, and evaluation of personnel; Job descriptions; Job analysis; Salary administration; Labor supply; Labor unions; Arbitration and bargaining; Industrial relations; Fringe benefits, and incentives; Manpower allocation requirements and utilization.

For library and information science personnel, use 88D. For health personnel, use 44P.

**70E-Research Program Administration & Technology Transfer**
Research management, development, and forecasting; Research contract management; Research needs; Technology transfer and forecasting. Excludes research methods per se. Studies of specific programs are excluded unless they discuss a program at the national level, technology innovation, or trends and impacts of new technology.

**70F-Public Administration & Government**
National, state, and local government structure, operation, and administration. Operations of government agencies and their interactions; Intergovernmental relations.

See also 43, 91G, and 91H.

**70G-Productivity**
Productivity of businesses, government, employees, management, and services; Improving quality of work life; Measurement of productivity efficiency and effectiveness; Employee attitudes and motivation, manpower utilization and performance improvement, job satisfaction, job security; Labor-management cooperation, joint committees participative management, job redesign; Alternative work schedules; Incentive plans. Productivity barriers including regulations, obsolete practices, paperwork, and financing methods.

See also 70B, 70D, 70F, 96A, and 96G.

For specific applications of productivity to manufacturing, use 41D and 94.

## 71-MATERIALS SCIENCES

**710-General**
Advanced materials.

See also 41K.

**71A-Ablative Materials & Ablation**
Physical, mechanical, and structural properties; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; Ablation processes and chemistry; Reentry vehicle heat shields.

For production planning, use 41 and 94.

**71B-Adhesives & Sealants**

Adhesives; Glues; Binders; Sealants; Seals; Gaskets; Physical, mechanical, and structural properties; Performance; Fabrication and manufacturing; Equipment directly related to processing.

See also 71L and 94G.

For concrete cements, use 50C and 89G.

For propellant binders, use 79A and 81H.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71C-Carbon & Graphite**

Carbon and graphite fibers and textiles; Charcoal; Carbon black; Carbon and graphite coatings; Industrial diamonds; Physical, mechanical, and structural properties; Performance, fabrication and manufacturing methods; Equipment directly related to processing.

See also 71A, 71E, 71F, 71I, 71L, and 94G.

For carbon and graphite composites, use 71F.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71D-Ceramics, Refractories, & Glass**

Glasses; Brick; Porcelain; Ceramic coatings; Ceramic fibers; Physical, mechanical, and structural properties; Performance; Fabrication and manufacturing; Equipment directly related to processing; Studies of individual structural members; Cement properties.

See also 71E, 71I, 71L, and 94G.

For concrete and cement used as building materials, use 50C and 89G.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71E-Coatings, Colorants, & Finishes**

Paints and primers; Varnishes; Corrosion resistant coatings; Coating pigments; Carbon, ceramic, plastic, rubber and metal coatings; Physical, mechanical and structural properties; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; Electroplating; Electrodeposition; Flame and plasma spraying; Vapor deposition.

See also 71G, 71L, and 94G.

For surface treatment not involved with coatings, use 94G.

For dielectric and semiconducting films, use 46 and 49.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71F-Composite Materials**

Materials composed of two or more physically distinct constituents; Reinforced plastics, graphite or carbon composites; Laminates; Metal matrix composites; Fiber and particulate composites; Physical, mechanical, and structural properties; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; Studies of individual structural members.

See also 71L and 94G.

For wood composites, use 71R.

For concrete and reinforced concrete, use 50C and 89G.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71G-Corrosion & Corrosion Inhibition**

Unwanted chemical reaction effects on metals; Corrosion of metals; Rusting; Corrosion inhibitors; Corrosion resistant coatings; Corrosion electrochemistry.

See also 71E and 71L.

For concrete corrosion, use 50C and 89G.

**71H-Elastomers**

Rubbers; Additives; Curing agents; Elastomer polymerization; Physical, chemical, mechanical, and structural properties; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; Studies of individual structural members.

See also 71E, 71I, 71L, 94G, and 99C.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71I-Fibers & Textiles**

Glass, carbon, ceramic, metal, and polymeric fibers; Threads, yarns, textile, and fiber finishing, including dyeing and sizing; Physical, chemical, mechanical, and structural properties; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; Studies of individual structural members; Flame resistance.

See also 71L and 94G.

For fiber composites, use 71F.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71J-Iron & Iron Alloys**

Includes steels or alloys containing more than 50% iron. Coatings; Fibers; Extractive metallurgy; Refining; Embrittlement; Physical, mechanical, and structural properties; Microstructure; Phase studies; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; Studies of individual structural members.

See also 71E, 71I, and 71L.

For corrosion, use 71G.

For beneficiation, use 48A.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71K-Lubricants & Hydraulic Fluids**

Solid and liquid lubricants; Additives; Greases; Drilling fluids; Brake fluids; Physical, chemical, mechanical and structural properties; Performance; Manufacturing; Equipment directly related to processing; Chemical synthesis.

See also 71L and 41L.

For pollution studies, use 68. For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71L-Materials Degradation & Fouling**

Aging; Erosion and cavitation erosion; Wear; Weathering; Decay; Effects of radiation on materials; Biodeterioration, including fungus deterioration.

See also 71C, 71D, 71F, 71H, 71I, 71J, 71K, 71N, and 71R.

For nuclear reactor materials degradation, see also 77I or 77J. If concerned with nuclear propulsion, use 81I.

**71M-Miscellaneous Materials**

Materials not included in another group, including leather, fur, refrigerants, and waxes; Physical, mechanical, and structural properties; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; Studies of individual structural members.

See also 94G.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71N-Nonferrous Metals & Alloys**

Includes studies not specifying the type of metal. Coatings; Fibers; Extractive metallurgy; Refining; Embrittlement; Physical, mechanical, and structural properties; Microstructure; Phase studies; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; studies of individual structural members.

See also 71E, 71I, and 71L.

For metal fabrication, use 94G.

For corrosion, use 71G.

For beneficiation, use 48A.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71O-Plastics**

Additives; Curing agents; Plastic coatings; Plastic polymerization; Physical, chemical, mechanical, and structural properties; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; Studies of individual structural members.

See also 71E, 71L, 94G, and 99C.

For plastic composites, use 71F.

For polymeric fibers, use 71I.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71P-Refractory Metals & Alloys**

Includes only the following metals and alloys having more than 50% of these metals: iridium, molybdenum, niobium (columbium), osmium, rhenium, tantalum, and tungsten. Coatings; Fibers; Extractive metallurgy; Refining; Embrittlement; Physical, mechanical, and structural properties; Microstructure; Phase studies; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; Studies of individual structural members.

See also 71E, 71I, and 71L.

For metal fabrication, use 94G.

For corrosion, use 71G.

For beneficiation, use 48A.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71Q-Solvents, Cleaners, & Abrasives**

Cleaning compositions; Solvents; Detergents; Soaps and abrasives; Cleaning action of these materials; Physical and chemical properties; Performance; Manufacturing; Equipment directly related to processing.

For cleaning techniques, use 94G.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

**71R-Wood & Paper Products**

Sawing and milling; Lumbering; Plywood, particle and fiber board; Wood product fabrication; Pulping, papermaking, and conversion processes; Physical, chemical, mechanical, and structural properties; Performance; Fabrication and manufacturing methods; Equipment directly related to processing; Studies of individual structural members.

See also 94G.

For forestry and tree production, use 48D.

For pollution studies, use 68.

For industry economics and marketing, use 96.

For production planning, use 41 and 94.

## 72-MATHEMATICAL SCIENCES

**720-General**

**72B-Algebra, Analysis, Geometry, & Mathematical Logic**

Algebra and number theory, including field theory (algebra), group theory, ring theory; Analysis, including calculus of variations, complex variables, differential equations, Fourier analysis, functional analysis, functions (mathematics), measure, and integration; Geometry, tensor analysis, and topology; Mathematical logic, including foundations of mathematics, lattices (mathematics), metamathematics, and set theory.

For applications of mathematics, see the appropriate category of application.

**72E-Operations Research**
Game theory; Queueing theory; Management games; Mathematical models; Mathematical programming, Network flows; Search theory.

See also Managerial practice, 70B.

For operations research applied to a specific application, see the field of application.

**72F-Statistical Analysis**
Analysis of variance; Correlations techniques; Discriminate analysis; Distribution theory; Experimental design; Factor analysis; Nonparametric statistics; Probability theory; Regression analysis; Statistical decision

theory; Statistical inference; Statistical tests; Stochastic processes.

For statistical analysis applied to a specific application, see the field of application.

## 74-MILITARY SCIENCES

**740-General**

**74A-Antiaircraft Defense Systems**
Tactical and terminal countermeasures against attacking aircraft that includes tracking and computing equipment, antiaircraft guns, rockets, and missiles.

For specific missiles and rockets, use 75.

**74B-Antimissile Defense Systems**
Point and terminal defense and countermeasures against air-, surface-, or underwater-launched missiles, bombardment satellites. Includes land based and shipborne tracking and computing systems; Strategic Defense Initiatives (SDI), Star Wars; ballistic missile defense.

**74C-Antisubmarine Warfare**
Operations conducted against submarines, their supporting forces and operating bases. Include air, surface, and underwater operations.

See also 63.

**74D-Chemical, Biological, & Radiological Warfare**
Design, development, and utilization of chemical, biological, and radiological weapons; Production, generation, and stability of lethal and nonlethal agents; Biological agents including anticrop and defoliating agents.

For nuclear weapons, use 74H.

**74E-Logistics, Military Facilities, & Supplies**
Procurement, storage, distribution, issue, repair, replacement of military equipment; Deployment of troops and cargo; Industrial mobilization; stock level controls and inventory techniques; Defense conversion; Downsizing; Base closures; Force reduction; Dual Use Technology; Continuous Acquisition and Life-cycle Support (CALS), formerly Computer Aided Acquisition and Logistics Support.

For related civilian studies, use 70 and 94.

**74F-Military Intelligence**
Techniques for collecting, evaluating, and disseminating information concerning foreign nations. Includes damage assessment; Surveillance and reconnaissance systems.

**74G-Military Operations, Strategy, & Tactics**
Joint and combined operations, campaigns, battles, invasions, theater operations; Planning analysis, appraisal, and threat evaluation; Methods of attack and support; Armed Forces maneuvers; Limited and unconventional warfare; Sabotage, insurgency, and counterinsurgency; Guerrilla warfare; Psychological and cold warfare.

**74H-Nuclear Warfare**
Design, development, and applications of nuclear weapons and devices; Studies of the physical effects of nuclear weapons; Arms control.

For nuclear guided missile warheads, use 75F.

**74I-Passive Defense Systems**
Systems, structures, and devices to provide area monitoring security and denial. Includes camouflage, barbed wire, minefields, warning systems, barriers, and other anti-intrusion devices.

For civil defense, see also 91I.

For personnel detection, see also 63G.

## 75-MISSILE TECHNOLOGY

**750-General**

**75A-Air & Space-Launched Missiles**
Design, construction and performance of missiles launched from aircraft or spacecraft.

**75B-Missile Guidance & Control Systems**
Techniques for guidance and control of missiles from launching to impact. Includes optical guidance, television guidance, wire guidance, preset and terminal guidance, inertial guidance, command guidance, and homing guidance.

**75C-Missile Launching & Support Systems**
Missile handling and launching. Includes transportation, storage, and preparation for launching; Air, space, surface, and underwater launching and support equipment and techniques; Checkout equipment and procedures; Guided missile ranges.

**75D-Missile Tracking Systems**
Techniques and systems for tracking missiles as defensive measures. Can be from surface installations or air and spaceborne platforms.

For antimissile defense systems, use 74B.

**75E-Missile Trajectories & Reentry Dynamics**
Determination, analysis, and processing of missile trajectory data; Flight path analysis; Impact prediction; Atmospheric reentry. Includes aerodynamic studies.

For spacecraft reentry, use 84D.

**75F-Missile Warheads & Fuses**
Design and performance of all types of missile warheads and fuzes-chemical, biological, nuclear and explosive.

For rockets, use 79H.

**75G-Surface-Launched Missiles**
Design, construction, and performance of missiles launched from the ground, surface platforms, vehicles, silos, and surface ships.

**75H-Underwater-Launched Missiles**
Design, construction, and performance of missiles launched from underwater.

## 76-NAVIGATION, GUIDANCE, & CONTROL

**760-General**

**76A-Control Devices & Equipment**
Navigation and guidance control equipment.

See also 76C.

**76B-Guidance Systems**
Design, development, and performance of complete guidance systems. Includes integration of specific components and subsystems necessary to assure course positioning.

**76C-Navigation & Guidance System Components**
Navigation computers; Gyros, radiators, sensors, indicators, etc., used in navigation of aircraft, ships, spacecraft, and ground vehicles.

**76D-Navigation Systems**
Design, development, and performance of complete navigation systems; Integration of specific components and subsystems necessary in direction finding (position, distance, and course of travel); Global navigation systems.

See also 85F.

## 77-NUCLEAR SCIENCE & TECHNOLOGY

**770-General**
Includes nuclear materials management, safeguards, accounting methods.

See also 77I.

**77A-Fusion Devices (Thermonuclear)**
Theory, design, construction, and operation of devices for producing controlled thermonuclear fusion reactions; Nuclear fusion reactor materials and fuels.

For plasma studies in thermonuclear devices, see also 46G.

**77B-Isotopes**
Identification, separation, and concentration of radioactive isotopes. Includes isotopic irradiation devices.

For radioactive isotopes polluting the environment, use 68F.

For the use of isotopes in labeling chemical reactions, use 99F.

For the use of isotopes in medical/biological applications, use 57.

**77C-Nuclear Auxiliary Power Systems**
SNAP technology, both isotopic and reactor; Isotopic power supplies; Small scale electricity generation by nuclear means.

For nuclear propulsion, see the field of application.

**77D-Nuclear Explosions & Devices**
Explosion effects, including shock waves, ground motion, electromagnetic pulses, primary radiation, injection of charged particles into radiation belts; Testing of nuclear devices (including nuclear simulation using chemical explosives); Peaceful applications (e.g., Plowshare).

For effects on communications and electronics systems, see the field of application.

For military applications, use 74H.

**77E-Nuclear Instrumentation**
Nuclear radiation detection and measurement devices and systems; Beta particle detectors.

For X-ray detectors, use 46Gen.

For health physics instrumentation, use 57V.

**77F-Radiation Shielding, Protection, & Safety**
Shielding design, nuclear radiation transport properties of materials, decontamination; Container design and transportation requirements for radioactive materials; Fallout shelters.

See also 91I.

**77G-Radioactive Wastes & Radioactivity**
Separation, processing, handling, storage, disposal, and reuse of radioactive wastes; Radioactive fallout; Fission products; Man-made or natural radioactivity; Decommissioning.

For radiation pollution, use 68F.

**77H-Reactor Engineering & Nuclear Power Plants**
Engineering related directly to the design, safety, and operation of a reactor; Research and test reactors. Integrated assemblage, including reactor and turbogenerator equipment, plus control and regulatory devices of a nuclear power plant, either mobile or stationary; Includes site selection and feasibility studies; Engineering aspects of reactor accidents.

See also 77C.

For critical assemblies and reactor simulation, use 77K.

**77I-Reactor Fuels & Fuel Processing**
Production, testing, design, or reclamation of nuclear fuel materials, reactor fuel elements (includes cladding) and fuel assemblies. Includes nuclear fuel cycle studies for nuclear materials management; Nuclear fuel reprocessing.

For processing of nonrecoverable fuel materials and fuel contaminants, use 77G.

**77J-Reactor Materials**
Production, testing, design, or reclamation of coolants, control materials, moderators, structural materials such as pipe materials; Shielding materials, and steels. Includes fabricated elements or assemblies and specific configurations.

For the effects of radiation on materials, see also 71L or 71J.

For fuel materials, cladding, or fuel assemblies, use 77I. Excludes power generating equipment and nuclear fusion reactor materials.

**77K-Reactor Physics**
Reactor kinetics, reactor theory, neutron transport theory, and criticality. Includes critical assemblies and reactor simulators.

## 79-ORDNANCE

**790-General**

**79A-Ammunition, Explosives, & Pyrotechnics**
Projectiles, fuzes, demolition explosives, detonators, grenades, land mines, high explosives, primers, powder and liquid propellants, flame throwers, and equipment for handling these items; Production, performance, storage stability of incendiaries, pyrotechnics, screening agents (smokes), etc.

For nuclear weapons, use 74H.

For rocket propellants, use 81.

**79B-Armor**
Design, testing, and performance of armor and armor plate including bullet proof, flak proof, explosion proof, and fragment proof devices and related equipment.

For other types of protective devices, see the application.

**79C-Bombs**
High-explosive, fragmentation, antipersonnel, armor piercing, incendiary, napalm, general purpose, and similar types of bombs; Bomb handling equipment; Storage.

For bomb directors and bomb release mechanisms, use 79F; For nuclear bombs, use 74H.

**79D-Combat Vehicles**
Military vehicles including armored wheeled and track-laying vehicles, tanks and reconnaissance vehicles, trucks, gun carriers; Components and accessories.

**79E-Detonations, Explosion Effects, & Ballistics**
Explosion effects (except nuclear) such as blast, shock waves, detonation waves, cratering, earth motion or movement, heat, etc.; Interior, exterior, and terminal ballistics; The study of motion, behavior, and aerodynamics of projectiles thrown or launched by ordnance projectors; Includes target vulnerability and damage assessment studies, weapons effects.

For nuclear explosion effects, use 77D.

**79F-Fire Control & Bombing Systems**
Fire control computers, sights, directors, range finders, gunlaying, bombing radar systems, boresighting, bomb releases, and other devices used specifically for directing the firing of weapons or the dropping of bombs.

**79G-Guns**
Small arms, automatic weapons, antipersonnel weapons, recoiless weapons, mortars, artillery and naval guns, their accessories and components; Gun carriages, gun mounts, remote control equipment, etc.

For ballistic studies, use 79E.

For gun control, social violence, use 92C or 43.

**79H-Rockets**
Unguided, self-propelled projectiles whose trajectory or course cannot be altered after launch; Ground launched, air launched, or ship launched rockets, launchers, and launch support equipment.

For sounding rockets, use 55D.

**79I-Underwater Ordnance**
Torpedoes, submarine mines, depth charges, hydrobombs, antisubmarine ammunition, etc.; Launching devices and support equipment.

## 81-COMBUSTION, ENGINES, & PROPELLANTS

**810-General**

**81A-Combustion & Ignition**
Autoignition, ignition, and combustion. Includes flame studies; Combustion products studies; Ignition systems; Combustion chemistry; Flammability studies.

See also 89 and 94H.

**81B-Electric & Ion Propulsion**
All types of engines deriving power from free ions and electrons. Includes ion, plasma, and arc jet systems; Propulsion by means of solar wind; Laser propulsion.

For electrically propelled surface vehicles, use 85.

**81C-Fuel & Propellant Tanks**
Design, performance, and testing of fuel and propellant tanks including those for automobiles, petroleum products, and rocket propellants.

**81D-Jet & Gas Turbine Engines**
Design, performance, and testing of all types of jet and gas turbine engines, their components, engine nozzles. Includes Ramjet, Scramjet, and Turbofan engines, and hydroduct and turbomachinery as well as nonpropulsive turbines.

See also 97L and 51C.

**81G-Rocket Engines & Motors**
Design, performance, and testing of rocket engines and motors and their components.

**81H-Rocket Propellants**
Production, handling, stability, and performance of liquid, solid, thixotropic, and exotic propellants. Includes fuels, oxidizers, additives, and binders.

For combustion and ignition, use 81A.

**81I-Nuclear Propulsion**
Design, performance, and testing of nuclear engines for surface, air, and space propulsion.

See also 85.

**81J-Reciprocation & Rotating Combustion Engines**
Design, performance, and testing of reciprocating and rotating engines of various configurations for all types of propulsion. Includes internal and external combustion engines; Engine exhaust systems; Engine air systems components; Engine structures; Stirling and diesel engines.

See also 97L and 85H.

## 82-PHOTOGRAPHY & RECORDING DEVICES

**820-General**

**82A-Holography**
Techniques, materials, and uses of holography and holograms; Acoustic holography.

See also 46C.

**82B-Photographic Techniques & Equipment**
Photographic techniques, including aerial photography, color photography, astronomical photography, cinematography, photomicrography, Schlieren photography; Cameras, lenses, shutters, projectors, photographic processes, and materials; Microphotography, Photographic copying; Direct recording and reproduction of visual images; Copying, reproduction and replication techniques; Thermography; Lithography, and related arts; Graphic arts, illustrating, visual design.

For photogrammetry, use 48I.

**82C-Recording Devices**
Techniques and devices for recording other than visual images. Includes disk, magnetic, thermoplastic, electrostatic recording systems, CD-ROM, and playback equipment such as record players, tape recorders, etc.

## 84-SPACE TECHNOLOGY

**840-General**
Extraterrestial biology, chemistry, and medicine.

**84A-Astronautics**
Space missions; Projects and logistics; Orbital rendezvous; Space exploration; Spacecraft operating problems; Extravehicular activity.

**84B-Extraterrestial Exploration**
Space probe exploration; Space landings; Space construction and maintenance; Extravehicular activity on other planets.

**84C-Manned Spacecraft**
Design and construction of manned spacecraft, space stations, aerospace planes and their components.

**84D-Spacecraft Trajectories & Flight Mechanics**
Determination, analysis, processing of spacecraft trajectory data; Space mechanics; Orbital calculations; Flight path analysis; Atmosphere entry; Reentry dynamics.

**84E-Space Launch Vehicles & Support Equipment**
Handling and launching, including transportation, storage, preparation for launching, countdown, launching equipment, checkout equipment, ground support equipment, and information systems; Spacecraft tracking systems; Tracking networks; Recovery support.

**84F-Space Safety**
Safety measures and devices directed toward reducing the hazards of spaceflight.

**84G-Unmanned Spacecraft**
Design and construction of unmanned spacecraft, including space probes, scientific satellites, military satellites, communication satellites, reconnaissance satellites, and navigational satellites.

For satellites applied to a specific application, see the field of application.

## 85-TRANSPORTATION

**850-General**

**85A-Air Transportation**
Operation of systems for transport by air; Civil aviation; Airports and airport access; Airline operations; Air routing; Air traffic control systems; Multimodal systems; Aviation safety and aviation accidents; Aircraft fires; Aircraft fuel fires.

See also 43G, 74E, 76, 85D, and 91B.

For design of aircraft and components, use 51 and 81.

For runway construction and design, use 50B.

**85C-Metropolitan Rail Transportation**
Urban rail transit; Underground and above-ground rapid transit railways, including subways; Automated guideway transit systems; Tracked air cushion vehicles.

See also 85I and 91B.

**85D-Transportation Safety**
Safety and accidents involving air, land, and water transportation; Accident studies and prevention; Alcohol related studies; Breakaway barriers and structures; Standards and testing of components and equipment; Crashworthiness; Traffic safety; Collision research; Safety equipment and devices.

See also 91B.

For pipeline accidents, use 85E.

**85E-Pipeline Transportation**
Transportation of liquids, gases, and slurries through long-distance pipelines; Accidents and safety.

**85F-Global Navigation Systems**
Worldwide navigational aids to transportation; Global positioning system (GPS).

See also 76D.

**85G-Marine & Waterway Transportation**
Shipping; Safety and accidents; Safety equipment; Cargo handling and equipment; Cargo movement; Passenger movement; Traffic control; Boating; Trade routes; Shipborne containerization.

See also 43G, 74E, 76, and 85D.

For marine engineering, use 47A.

For waterway engineering, use 50B.

**85H-Road Transportation**
Passenger and cargo movement; Design and standards for vehicles and components; Motor vehicle engine studies; Safety engineering; Safety devices; Traffic and road safety; Collision research; Accident studies; Highway traffic; Traffic engineering; Passenger and cargo vehicles; Trailers; Motorcycles; Bicycles and bikeways; Hiking trails.

See also 43G, 50A, 74E, 81J, 85D, and 91B.

**85I-Railroad Transportation**
Safety and accidents; Safety equipment; Cargo handling and equipment; Cargo movement; Passenger movement; Traffic control; Terminals; Amtrak; Track studies; Rolling stock; Scheduling; Railroad engineering and equipment.

See also 43G, 85D, and 91B.

## 88-LIBRARY & INFORMATION SCIENCES

**880-General**
Includes general studies about microforms; Film readers; Copyrights; Privacy Act; Report writing.

**88A-Operations & Planning**
Acquisitions, classification, cataloging, abstracting, and indexing; Circulation and reference systems; Information services; Interlibrary loans; Distribution; Manual and computerized information retrieval; Individual libraries and information center.

For library or information networks, use 88B.

**88B-Information Systems**
Library and information networks; Operations and planning of these systems; File maintenance and management; Database management; Information superhighway, National Information Infrastructure; Applied information systems (Management, medical, transportation, etc.) See also 44T, 62, and 70C.

For database management, use 62B.

For communications and computer networks, use 45C.

For geographic information systems, see 48I.

**88C-Marketing & User Services**
User needs, surveys; Promotions; Fees.

**88D-Personnel**
Training and education; Selection; Management; Performance; Schools and accreditation.

See also 70D.

**88E-Reference Materials**
Bibliographies; Directories; Glossaries; Catalogs; Thesauri; Indexes; Abstract and title periodicals.

## 89-BUILDING INDUSTRY TECHNOLOGY

Includes fires in buildings.

**890-General**
Includes fires in buildings.

**89B-Architectural Design & Environmental Engineering**
Architecture; Human engineering; Site surveys; Interior design; Lighting; Heating, ventilating, and air conditioning; Heat loss studies. Includes environmental engineering equipment.

See also 97J and 94E.

**89C-Construction Management & Techniques**
Excavation; Fabrication (presite and onsite); Construction techniques; Reconstruction; Management including planning, manpower, and labor studies.

**89D-Structural Analyses**
Dynamics and statics of structures and structural members including kinetics, kinematics, vibration and stress analyses; Induced environmental stresses including earthquakes, wind, and flood; Foundation stresses; Soil-structure interactions.

**89E-Building Standards & Codes**
Standards and codes for buildings, equipment, components, and materials.

**89G-Construction Materials, Components, & Equipment**
Plumbing; Wiring; Insulation; Doors and windows; Walls; Joints; Beams; Construction equipment such as bulldozers and cranes. Includes flammability and fire studies. Cement and concrete.

See also 50C.

For cement properties, see also 71D.

**89H-Building Equipment, Furnishings, & Maintenance**
Equipment including security alarms (i.e. Burglar alarms), elevators, and fire safety devices; Furnishings, including major household appliances, rugs, and furniture; Maintenance, including repair, pest control, and cleaning.

For environmental engineering equipment, use 89B.

## 90-GOVERNMENT INVENTIONS FOR LICENSING

For patents and patent applications only (will be labeled as such in the report title); Not for bibliographies.

**900-General**
Computer software.

**90A-Mechanical Devices & Equipment**
Devices and equipment for fuel ignition; Heating, illumination, and refrigeration; Cleaning; Printing; Product handling and transportation; Sprinklers; Fire extinguishers; Safety; Motor and other land

vehicles; Earthworking and excavating; Tools; Jacks; Hydraulic and pneumatic systems; Power transmissions; Couplings, fasteners, and joints; Piping; Drilling and mining; Separators; Locks; Sewing machines; Winding and reeling; etc.

For metal shaping and forming, use 90E.

For medical equipment, use 90D.

**90B-Chemistry**

Organic and inorganic compounds; Batteries; Electrochemistry; Hydrocarbons; Lubricating compositions; Propellents and rocket fuels; Acids; Polymers; Plastics; Inks; Bleaching; Dyeing; Fertilizers; Food fermentation; Sugar and starch; Paper making; Textiles; Paints; Coatings (except metal coatings); Chemical reactors; etc.

**90C-Nuclear Technology**

Reactors; Radioactive materials; Nuclear instrumentation; Nuclear radiation safety; Nuclear power plants and reactor engineering; Nuclear fusion; Particle accelerators; Plasma devices; etc.

**90D-Biology & Medicine**

Drugs; Cosmetics; Prosthetics; Medical equipment; Pesticide biology; Biological laboratory equipment; Life support equipment.

**90E-Metallurgy**

Metal stock; Metal coatings; Molding, shaping, and treating processes; Laminating; Glasses; Material shaping; Sheet metal and wire working; Bonding and joining; Cutlery; etc.

For use of mechanical equipment, use 90A.

**90F-Electrotechnology**

Antennas, circuits, and electromechanical devices; Electron tubes; Optoelectronic devices; Power and signal transmission devices; Resistive, capacitive and inductive components; Semiconductor devices; Information transmission, storage, and retrieval; Communications; etc.

**90G-Instruments**

Photographic equipment; Measuring and testing instruments and equipments; Acoustic devices; Etc.

For nuclear instruments, use 90C.

**90H-Optics & Lasers**

Optical materials, components, equipment, and systems; Infrared, visible, ultraviolet, and X-ray lasers; Masers.

**90I-Ordnance**

Production and performance of projectiles, fuzes, explosive materials, pyrotechnics, and weapon systems (not limited to military applications); Ordnance storage systems; Fire control systems; Weapons delivery systems; Missiles, rockets, and propellants directly related thereto; Weapons carriers (tanks, aircraft ships, etc); Guns; Laser weapons; Bombs.

**90J-Food Technology**

Pasteurizing, curing, canning, dehydrating, freezing, irradiation, freeze drying, etc., of foods and other agricultural products; Sanitation and fumigation of products; Food additives and preservatives; Analysis and inspection of products; Storage, packaging, and display of products; Cooking devices.

For food fermentation, use 90B.

## 91-URBAN & REGIONAL TECHNOLOGY & DEVELOPMENT

**910-General**

Includes energy studies.

**91A-Environmental Management & Planning**

Air, water, noise, and waste management and control; Monitoring services; Solid wastes and recycling; Solid waste landfills; Water quality management; Environmental surveys; Design and operation of sewer systems (combined, etc.); Water supplies and services; Excludes natural resource management.

See also 68 and 43F.

**91B-Transportation & Traffic Planning**

Planning for modes of public and private, passenger and cargo transporation; Travel patterns and demand; Parking; Traffic engineering, traffic flow and control; Traffic surveys; Highway and street services; Rapid transit systems; Passenger transportation and planning; Pedestrian movement.

See also 43G and 85.

**91C-Fire Services, Law Enforcement, & Criminal Justice**

Fire, police, and court services and their administration; Law enforcement and criminal justice; Crime and fire prevention; Personnel recruitment, training, and utilization; Parole; Work release; Correctional institutions.

See also 43D.

For criminal justice and corrections, see also 43Gen.

**91D-Communications**

Use and planning of communications; Mass media, emergency communications, public information.

See also 45.

**91E-Housing**

Surveys and assessments of existing housing; Planning and development; Building codes; Housing needs; Housing renovation; Public housing.

For design, architectural, or construction related studies, see also 89.

**91F-Health Services**

Urban health services; Emergency medical services; Mental health services; Nursing homes; Ambulatory health services; Hospital services; Public health access.

See also 43C, 43D, 44 and 91I.

**91G-Urban Administration & Planning**
General administration and planning; Feasibility studies; Appraisal of real property; Taxation; Land use and zoning; Urban revitalization; Financing.

See also 43 and 70F.

**91H-Regional Administration & Planning**
General administration and planning for county and regional areas that may also contain urban or urbanized areas; Intergovernmental relations and interactions (State, County, Local); Land use and zoning.

See also 43 and 70F.

For state government administration and planning, use 43.

**91I-Emergency Services & Planning**
Disaster services; Civil defense; Early warning systems and emergency preparedness for all types of disaster; Emergency weather services; Pollution alerts; Civil disturbances; Ambulance services; Flooding; Disaster relief.

See also 43D, 44, and 91F.

For military passive defense systems, see also 74I.

For personnel detection, see also 63G.

**91J-Economic Studies**
Economic analyses; Economic development; Industrial development; Economic impacts of development; Population-economy-income studies; Employment and earnings; Property values; Commercial area studies.

See also 43B and 96.

For government financial operations, use 43A, 70F, 91G, and 91H.

**91K-Social Services**
Child care; Family and youth counseling; Social rehabilitation; Foster homes and adoption; Welfare and public assistance; Financial assistance; Food stamp services; Employment services; Legal services.

See also 43C, 91F, and 92C.

**91L-Recreation**
Planning and administration; Facilities; Public opinion; Economic and social aspects; Safety aspects; Use of recreational vehicles; Cultural activities; Sports; Parks, including national parks.

## 92-BEHAVIOR & SOCIETY

**920-General**
Includes general overall census studies; Political science.

**92A-Job Training & Career Development**
Vocational training; On-the-job training; Retraining; Vocational rehabilitation; Use and design of training simulators (including flight simulators) and equipment; Instructional aids; Professional development; Career development.

For curriculum development, use 92D.

**92B-Psychology**
Human behavior; Personality; Intelligence; Learning ability; Judgement; Motivation; Perception; Job satisfaction; Leadership characteristics; Psychometrics; Adaptability; Social, industrial, group, organizational, interpersonal, and experimental psychology; Clinical psychology; Physiological psychology.

For the measurement of hearing, vision, heart rate, respiration and other physiological responses as related to behavior, use 57T or 57W.

**92C-Social Concerns**
Sociology and sociometrics; Race relations; Age group and minority group studies; Social rehabilitation of drug abusers, alcoholics, physically, emotionally, and mentally handicapped, offenders, etc.; Cultural and economic deprivation; Social discrimination; Immigration; Demography; Social services, including child care, welfare, counseling, financial assistance, and employment and unemployment services; Attitude studies.

See also 43C, 44, and 91K.

**92D-Education, Law, & Humanities**
Formal education; School systems; Educational administration; Curricula; Instructional devices and materials, including audiovisual; Teaching methods; Computer-assisted instruction; Laws; Linguistics; Machine translation; Fine arts; Archaeology; History; Anthropology; Humanities; Religion.

**92E-International Relations**
Political and social indicators; Crises and crisis management; Conflict analysis; Foreign aid; Foreign policy and foreign affairs; International political science; Disarmament and arms control; Espionage; Includes international relationships concerning territorial seas, fishing, extradition, and natural resources.

See also 74H.

For international commerce, use 96C.

## 94-INDUSTRIAL & MECHANICAL ENGINEERING

**940-General**
Includes bearings; Mechanical elements; Pipes; Tubes; Levers; Cams; Springs; Mechanical joints; Containers and packing materials; Refrigeration systems and equipment; Industrial furnaces and boilers; Heat exchangers; Heat pumps; Heat pipes; Industrial security; Metrology.

For rocket engine components, use 81G; For fuel tanks, use 81C; For cooling towers, use 97J; For nuclear security, use 77Gen.

**94A-Production Planning & Process Controls**
Materials control; Numerical control and automation; Time and motion studies ; Scheduling; Production controls and programming; Modeling techniques and program controls; Inventory management.

See also 44A, 41A and 41B.

**94B-Quality Control & Reliability**
Tolerances allocations; Maintainability requirements; Probability of satisfactory performance of components and equipment; Inspection methods; Destructive industrial testing; Reliability theory; Quality assurance.

See also 41E and 41G.

**94C-Plant Design & Maintenance**
Site selection; Plant design; Layout; Maintenance management; Scheduled, routine, and corrective maintenance.

See also 41H.

**94D-Job Environment**
Industrial hygiene and occupational diseases and injuries in settings such as factories, and office and commercial buildings; Industrial psychology; Industrial sociology; Workplace layout and design; Worker interactions.

See also 44G, 57U, 41I, and 92B.

For industrial safety engineering and accident prevention, use 94H.

**94E-Environmental Engineering**
Lighting; Heating; Ventilating; Air conditioning. Includes environmental engineering equipment related to industrial use. Excludes pollution control.

See also 41I, 89B and 97J.

**94F-Tooling, Machinery, & Tools**
Machine subassemblies; Robots; Robotics; Tools; Machinery, including hoists, conveyors and pumps.

See also 41C and 41J.

**94G-Manufacturing Processes & Materials Handling**
Fabrication, assembling, cleaning, and finishing; Industrial and manufacturing processes (limited to in-depth studies that directly discuss specific processes); Bonding and joining, including gluing, welding, soldering, and brazing; Materials forming and machining; Heat treatment; Coating processes; Materials handling, including palletizing, conveying, warehousing, storing, containerization, and packaging.

See also 71, 41B, 41E, and 41F.

For processing and packaging of food, use 98H.

For production of materials, use 71.

For chemical engineering and processing, use 99B.

For the beneficiation and processing of minerals, use 48A.

**94H-Industrial Safety Engineering**
Accident prevention; Safety measures; Fire prevention; Warning systems; Safety equipment, structures, and clothing.

For industrial safety engineering applied to a specific application, use the field of application.

**94I-Hydraulic & Pneumatic Equipment**
Design, production, performance, and testing of hydraulic and pneumatic systems, accumulators, actuators, compressors, and distribution equipment; Fluidic and flueric devices.

See also 41J.

For hydraulic fluids, see 71K.

**94J-Nondestructive Testing**
Nondestructive testing having industrial application; Ultrasonic, radiographic, hydrostatic, magnetic, and optical nondestructive techniques and equipment; Nondestructive testing of flaws, thickness, opacity, strength.

For destructive industrial testing, use 94B.

**94K-Laboratory & Test Facility Design & Operation**
Measuring, testing, and simulation devices. Includes laboratories, test facilities, and test equipment measuring testing and simulation. If the test facility, equipment, etc. is applied to a specific application, use the field of application.

## 95-BIOMEDICAL TECHNOLOGY & HUMAN FACTORS ENGINEERING

**950-General**

**95A-Prosthetics & Mechanical Organs**
Includes materials and equipment going into human bodies, enabling them to function properly, either temporarily or permanently. Artificial limbs and limb braces; Facial prosthetics, including artificial eyes; Dental prosthetics; Mechanical organs and mechanical hearts; Circulatory assist devices; Artificial kidneys, etc.; Biocompatible materials including tissue adhesives, tissue compatible materials, and antithrombogenic materials.

For prosthodontics, use 57G.

**95B-Tissue Preservation & Storage**
Preservation of organs, tissue, and blood for transplantation or transfusion to living organs; Blood and tissue banks; Properties and evaluation of preserved and stored materials.

See also 57J, 57S, and 57X.

**95C-Biomedical Instrumentation & Bioengineering**
Includes materials and equipment used to monitor human body functions. Design, use, and performance of biomedical equipment; Biotelemetry including biotelemetry transducer and transmitter equipment; Hospital equipment and supplies; Dental materials and equipment; Equipment for physiological monitoring; Diagnostic equipment; Biomedical laboratory equipment.

See also 95A.

**95D-Human Factors Engineering**
Design of tools, instruments, equipment, and machinery with emphasis on optimum utilization by humans; Habitability of work and living space; Ergonomics; Interaction of man and equipment in terms of subsystem and system performance requirements and evaluation. Encompasses manual controls, tactical kinesthesis, and other human sensory modalities involved in operation of equipment and understanding of personnel subsystems; Man-machine systems. Includes anthropometric studies, protective equipment, protective clothing, and life support systems.

**95E-Life Support Systems**
Equipment and techniques for sustaining life in foreign environments, such as space, underground, and underwater; Closed ecological systems (includes pressure suits, diving gear, and breathing apparatus).

See also 95D.

**95F-Bionics & Artificial Intelligence**
Study of biological processes in order to develop engineering systems; Simulation of biological processes; Comparative studies of control systems formed by the brain and nervous system; Pattern recognition systems based on biological modes; Biological applications of information theory; Cybernetics.

**95G-Protective Equipment**
Equipment providing protection against such environmental elements as heat, cold, noise, machinery, and radiation.

For equipment and techniques for sustaining life in environments where normal respiration is not possible, use 95E.

## 96-BUSINESS & ECONOMICS

**960-General**
Includes economic theory; Business and economic census studies; Insurance not covered by another subcategory; Small businesses.

**96A-Domestic Commerce, Marketing, & Economics**
National and state-level studies; Industrial costs and economics; Economic impact of industries; Economic impacts on industries; Industrial statistics; Agricultural economics; Productivity; Labor supply and demand; Labor costs and economics; Inflation; Economic aspects of unemployment; Employment and unemployment statistics; Wage surveys; United States commerce; Wholesale and retail trade; Domestic market surveys; Business, personal, and property taxes; Income tax data; Franchising.

See also 43B, 70D, 91J, and 98B.

For studies of individual plants or operations, see the field of application; For economic impacts of individual plants or operations, see the field of application; For regional development, use 43B and 91J.

**96C-International Commerce, Marketing, & Economics**
Foreign market surveys and research; International trade; Imports and exports; Customs and tariffs; Multinational businesses; Trends and forecasting.

For international finance, use 96F.

**96D-Consumer Affairs**
Consumer problems and protection; Truth in advertising; Commercial psychology; Product maintenance and reliability problems; Home appliances safety; Product comparison studies; Flammability studies; Motor vehicle recalls.

**96E-Minority Enterprises**
Minority owned and operated businesses; Business training of minority groups; Franchising; Equal opportunities in business.

**96F-Banking & Finance**
Investments; Credit; Banks and trust companies; Mortgage finance; Savings and loan associations; Security and commodity brokerage; Balance of payments; Gold and silver movement; Cash flow; Regulations; International finance.

For government financial operations, use 43A, 70F, 91G, and / or 91H.

**96G-Foreign Industry Economic Development**
Private and governmental industrial and economic development in foreign countries including industrialized and developing countries; International technology transfer; For foreign market surveys and international trade, use 96C.

**96H-Foreign Business & Economics**
Foreign and developing countries; Businesses, economic conditions and socioeconomics.

For foreign market surveys and international trade, use 96C.

For social concerns related to economics, see also 92C.

## 97-ENERGY

**970-General**
Includes energy source development.

**97A-Reserves**
Natural reserves; Fuel stockpiles; Mineral and fossil fuel deposits including coal, uranium, petroleum, natural gas, geothermal, peat, and oil shale; Water power potential; Site studies of wind power potential and solar radiation availability.

For individual mine studies, use 48A.

**97B-Energy Use, Supply, & Demand**
Electric power and fuel consumption and requirements; Supply and demand; Heat use, supply, and demand.

**97E-Electric Power Transmission**
Electric power distribution; Electric transmission lines and substations; Electric power pools; Wireless energy transmission.

**97F-Fuel Conversion Processes**

Methods to convert a fuel to a different chemical form including coal gasification and liquefaction; Upgrading fuels by chemical synthesis.

For petroleum refining, oil shale retorting and refining, use 97K and 99B; For environmental studies, use 97R.

**97G-Policies, Regulations & Studies**

Energy conservation; Licensing; Legislation; Government policies and regulatory controls; Energy goals; Research needs; Energy management, economics, and financing; Depletion allowances and leasing policies; Rates and energy models; Energy shortages; International issues.

**97I-Electric Power Production**

Design and operation of electric power plants; Commercial, industrial, and residential electric power production; Site surveys; Large-scale nuclear, hydro, solar, geothermal, and fossil fuel electric power plants; Power plant boilers.

*Note: usually restricted to large-scale electric power production.*

For small-scale electric power production, use 97N, 97O, or 97P.

For pollution control and environmental impact, use 68 and 97R.

For some nuclear power plant studies, use 77 and 97Q. 97Q should be those that are most pertinent to the use of nuclear technology for energy production.

**97J-Heating & Cooling Systems**

Design and operation of space heating and cooling systems and equipment; Furnace and boiler studies when related to energy conservation and energy use; Cooling towers; MIUS technology; Total energy systems.

See also 97N.

**97K-Fuels**

Production, performance, properties, storage, prices, and transportation of all types of solid, liquid, and gaseous fuels; Chemical composition of fuels; Fuel compatibility; Hydrogen production; Refuse derived fuels; Fuel desulfurization; Oil shale retorting; Petroleum refining; Fuel additives; Growing plants for fuels; Bioconversion and biomass plantations.

See also 48D and 97N.

For fuel tanks, use 81C.

For nuclear fuels, use 77I.

For fuel conversion, use 97F.

For rocket fuels, use 81H.

For supply and demand, use 97B.

For oil and gas drilling and recovery, coal mining and other energy related mining studies, use 48A.

**97L-Engine Studies (Energy Related)**

Operation and design of engines when related to energy conservation and energy use. Covers turbine, rotary, and reciprocating engines.

See also 81.

**97M-Batteries & Components**

Electrochemical batteries of all types including alkaline cells, dry cells, metal-air batteries, primary cells, reserve batteries, storage batteries, thermal batteries, wet cells; Battery containers, depolarizers, electrodes, electrolytes, separators, and other components and materials; Battery chargers and testers; Battery electrochemistry.

For thermoelectric and thermionic batteries, use 97O.

**97N-Solar Energy**

Solar collectors, concentrators, and absorbers; Solar cells; Solar cookers, dryers, furnaces, generators; Solar heat engines; Solar heating and cooling systems; Solar power plants; Solar stills; Solar water heaters; Solar heat storage systems; Solar water pumps; Solar sea power plants; Orbital solar power plants; Optical coatings and filters for solar devices; Solar energy policies, use, supply, trends, and economics.

**97O-Miscellaneous Energy Conversion & Storage**

Fuel cells; Magnetohydrodynamics; Experimental electric generators; Turbogenerators; Heat storage; Compressed air energy storage; Mechanical conversion; Thermoelectric and thermionic conversion; Photovoltaic conversion (excludes solar cells); Wind power; Tidal power; Nuclear fusion power plants.

For commercial, industrial, and residential use of energy conversion and storage devices, use 97I or 97J.

**97P-Geothermal Energy**

Geothermal exploration and prospecting methods and equipment; Geothermal resources; Geothermal energy conversion; Geology applied to geothermal systems; Drilling; Reservoirs; Extraction; Site selection; Geothermal power plants; Corrosion studies; Materials used in geothermal systems.

**97Q-Selected Studies In Nuclear Technology**

Reports assigned to this subcategory are selected for their broad interest to users in the nuclear energy field.

For other nuclear energy subcategories, use 77.

**97R-Environmental Studies**

Air, noise, water, and solid waste pollution and pollution control from energy resource development, fuel production, energy production, and energy use; Environmental impacts of energy production and use.

See also 68.

## 98-AGRICULTURE & FOOD

**980-General**

**98A-Agricultural Chemistry**

The application of chemistry and chemical analysis to agriculture; Fertilizer production; Soil chemistry; Chemistry of feeding stuffs; Crop chemistry; Biochemical studies.

For food chemistry, use 98H.

**98B-Agricultural Economics**
Economics conditions, markets, subsidies, and policies affecting agriculture; Farm management and finance; Land and labor economics; Prices and price control.

See also 96C.

**98C-Agricultural Equipment, Facilities, & Operations**
Agricultural engineering; Agricultural machinery and tools; Seed preservation; Planting, fertilizing, mulching, weeding, and harvesting; Pest and disease control techniques and equipment; Crop protection; Crop drying and storage; Farm water supplies; Irrigation systems; Farm safety; Farm construction and operation.

For pest control, see also 57P.

For food processing, use 98H.

**98D-Agronomy, Horticulture, & Plant Pathology**
Field crop production; Cultivation of orchards, gardens and nurseries; Plant biology; Plant breeding, propagation, and hybridizing; Hydroponics.

See also 57C.

**98E-Animal Husbandry & Veterinary Medicine**
Production and care of domestic and wild animals; Breeding, feeding, management, rearing, testing, and training; Pets; Animal pathology; Toxic effects on domestic animals; Animal quarantine; Disease resistance, control and treatment; Breeding, care, and utilization of laboratory animals.

See also 57Z.

**98F-Fisheries & Aquaculture**
Fishing, fishing equipment, and shipboard processing of fisheries products; Cultivation of fishes, shellfish, and algae in fresh or salt water for commercial or recreational use; Use of fish ladders and weirs; Sport fishing.

See also 47D, 48B, and 57Z.

For fish processing, use 98H.

**98G-Agriculture Resource Surveys**
Surveys to scan crop yields, soil moisture content, crop diseases, and forest diseases. Includes fishery surveys; Satellite and aerial surveys.

**98H-Food Technology**
Pasteurizing, curing, canning, dehydrating, freezing, irradiation, freeze drying, etc., of foods and other agricultural products; Sanitation and fumigation of products; Food additives and preservatives; Analysis and inspection of products; Storage, packaging, and display of products; Kitchen and cooking equipment.

For biochemical studies of foods, see also 57B.

# 99-CHEMISTRY

**990-General**

**99A-Analytical Chemistry**
Techniques and instrumentation for the separation and analysis of individual compounds or specific groups or compounds, both inorganic and organic. Includes qualitative, quantitative, volumetric, gravimetric, optical, spectroscopic; electrochemical, ion exchange, chromatographic analysis; Test methods; Forensic chemistry; Data interpretation; Routine analysis or experimental results.

**99B-Industrial Chemistry & Chemical Process Engineering**
Techniques, processes, unit operations, and plant equipment that apply to chemical manufacturing, processing, transportation, and storage; Petroleum refining; Desalination technology; Pollution control equipment; Process control technology; Process engineering; Chemical reactors.

For coal gasification and liquefaction processes, see also 97F and 97K.

For specific environmental pollution control, see also 68.

For water purification, see also 50B and 68D.

**99C-Polymer Chemistry**
Synthesis, properties, reactions and theories of polymers and copolymers. Includes all types of polymerization, curing, crosslinking, reaction kinetics, etc.

For mechanical properties of polymers, use 71O and 71H.

**99D-Basic & Synthetic Chemistry**
Synthesis, properties, and reactions of inorganic and organic compounds; Studies of individual or specific groups of chemical elements; Molecular structure; Stereochemistry.

For chemical reaction mechanisms between atoms, ions, or molecules, see also 99F.

For spectrum analysis of compounds, use 99A and 99F.

**99E-Photochemistry & Radiation Chemistry**
Studies involving the interrelationships of electromagnetic or particle radiation and chemical reactions;
Studies of radioactive elements and their reactions; Radiochemistry; Photochemical reactions.

See also 55A and 68A.

**99F-Physical & Theoretical Chemistry**
Physical chemistry; Thermodynamics; Thermochemistry; Colloids and gels; Surface chemistry; Catalysis and catalysts; Electrochemistry; Solutions; Chemical equilibria; Membranes; Reaction kinetics; Quantum mechanics; The mathematical determination of atomic or molecular orbitals, energy levels, or properties; The application of mathematics to chemical systems and electronic spectra, excluding routine analysis or experimental results; Molecular spectra interpretation; Chemical reaction mechanisms in the gas, liquid, or solid phase between atoms, ions, or molecules; Atomic and molecular energy studies; Phase studies of nonmetallic systems; Isotherms; Crystallography.

For advanced materials, use 71Gen or the field of application.

For solid state physics, use 46D.

For thermodynamics, see also 46Gen.

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